NEC

Universal RAID Utility
User's Guide
Ver: 2.4

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Introduction

This User's Guide describes RAID System management utility "Universal RAID Utility" the version 2.4.
This User's Guide consists of the following four files.

- User's Guide : This file (uru24eug.pdf)
- Appendix A : Glossary (uru24euga.pdf)
- Appendix B : raidcmd Command Reference (uru24eugb.pdf)
- Appendix C : Logs/Events (uru24eugc.pdf)

See "Appendix A : Glossary" for the terms on the Universal RAID Utility and those used in this User's Guide. "Universal RAID Utility" indicates "Universal RAID Utility" the version 2.4.

Before using Universal RAID Utility, you should carefully read the User's Guide of the RAID System managed by the Universal RAID Utility and that of the computer in which the RAID System is installed.

The User's Guide is intended to be read by engineers who are fully familiar with the functions and operations of Windows and Linux. See the Windows and Linux online help and related documentation for the operations and concerns of Windows and Linux.

Symbols used in the text

The User's Guide uses the following three symbols. Follow these symbols and their meanings to use the Universal RAID Utility appropriately.

Symbol	Description
	Indicates a matter or caution you should particularly obey on operations of the Universal RAID Utility.
	Indicates a notice you should check to operate the Universal RAID Utility.
	Indicates effective or convenient information which help you if you know them.

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Overview

This chapter describes the overview of the Universal RAID Utility.

What is Universal RAID Utility?

The Universal RAID Utility enables RAID Systems in a computer to be managed.

The Universal RAID Utility is characterized as follows.

1. Allowing a variety of RAID Systems to be managed

   Conventionally, a specific management utility must be used for each RAID System. On the other hand, only the Universal RAID Utility can manage more than one RAID System. For the RAID Systems which the Universal RAID Utility can manage, see the documentation on computers and RAID Systems.

2. Operating in either Standard or Advanced Mode

   The Universal RAID Utility can operate in two RAID System Management Modes, which are Standard Mode and Advanced Modes.
   The Standard Mode provides the Universal RAID Utility with standard management functions of RAID Systems.
   The Advanced Mode provides the Universal RAID Utility with advanced management and maintenance functions of RAID Systems.
   Using the two RAID System Management Modes appropriately depending on users and jobs allows the usability of the Universal RAID Utility to be improved and malfunctions to be avoided.

3. Configuring RAID Systems easily

   Using the Universal RAID Utility, you can configure a RAID System easily without expert knowledge of the RAID System.
   The Universal RAID Utility provides the "simple Logical Drive create function" allowing a Logical Drive to be created by selecting only two selection items according to the guide of the Universal RAID Utility and the "Easy Configuration" allowing a RAID System to be configured only by defining uses of unused Physical Devices.

4. Supporting general functions required for configurations, operations and maintenances of RAID Systems

   The Universal RAID Utility supports general functions for configuring a RAID System (including creating Logical Drive and making Hot Spare), general operation functions (including log recording, Patrol Read and Consistency Check), and general functions required for maintenance (including Rebuild and Locate functions).

5. Troubleshooting RAID Systems

   The Universal RAID Utility can detect failures occurred in RAID Systems by using various functions.
   The RAID Viewer, the GUI of the Universal RAID Utility, indicates the configurations and status of RAID Systems comprehensibly with trees and icons. The raidcmd, the CLI of the Universal RAID Utility, indicates the same information too. In addition, the Universal RAID Utility registers failures occurred in RAID Systems not only to the dedicated log but also the OS log. Further, the Universal RAID Utility can send alerts to the NEC ESMPRO Manager normally attached to NEC Express series systems.

6. RAID System Management by NEC ESMPRO Manager

   Universal RAID Utility (Windows / Linux Edition) can manage the RAID System using NEC ESMPRO Manager Ver. 5.3 or later. The RAID System that exists in a remote environment can be managed by using NEC ESMPRO Manager like RAID Viewer and Log Viewer.

Structure of Universal RAID Utility

The Universal RAID Utility consists of the following modules:. The module that can be used is different depending on operating system.

- **raidsrv service**
  The raidsrv service always operates in the computer to manage RAID Systems. Receiving a processing request from the RAID Viewer or raidcmd, the raidsrv service provides proper information on a RAID System or performs an appropriate operation for the RAID System. In addition, the raidsrv service manages events occurred in RAID Systems, notifies the RAID Viewer of the events and/or registers them to several logs.
- **RAID Viewer (Windows Edition only)**
  The RAID Viewer is the Windows application managing and monitoring the RAID System by GUI. The RAID Viewer displays the configuration and status of a RAID System graphically or provides configuration and operation for a RAID System.
- **Log Viewer (Windows Edition only)**
  The Log Viewer is the Windows application viewing the event of RAID System. The Log Viewer allows you to see the RAID Log in which events occurred in RAID Systems are registered.
- **raidcmd**
  The raidcmd is the application managing and monitoring the RAID System by CLI.
  The raidcmd is the command that indicates the configuration and status of a RAID System or operates on a console providing configurations and operations.
- **NEC ESMPRO Manager Communication Module / raidsrv Agent**
  When the RAID System is managed in NEC ESMPRO Manager, raidsrv Agent controls the communication between NEC ESMPRO Manager and Universal RAID Utility.

Operating System	Windows	Linux	VMware ESX
raidsrv service	✓	✓	✓
RAID Viewer	✓		
Log Viewer	✓		
raidcmd	✓	✓	✓
NEC ESMPRO Manager Communication Module (raidsrv Agent)	✓	✓	✓

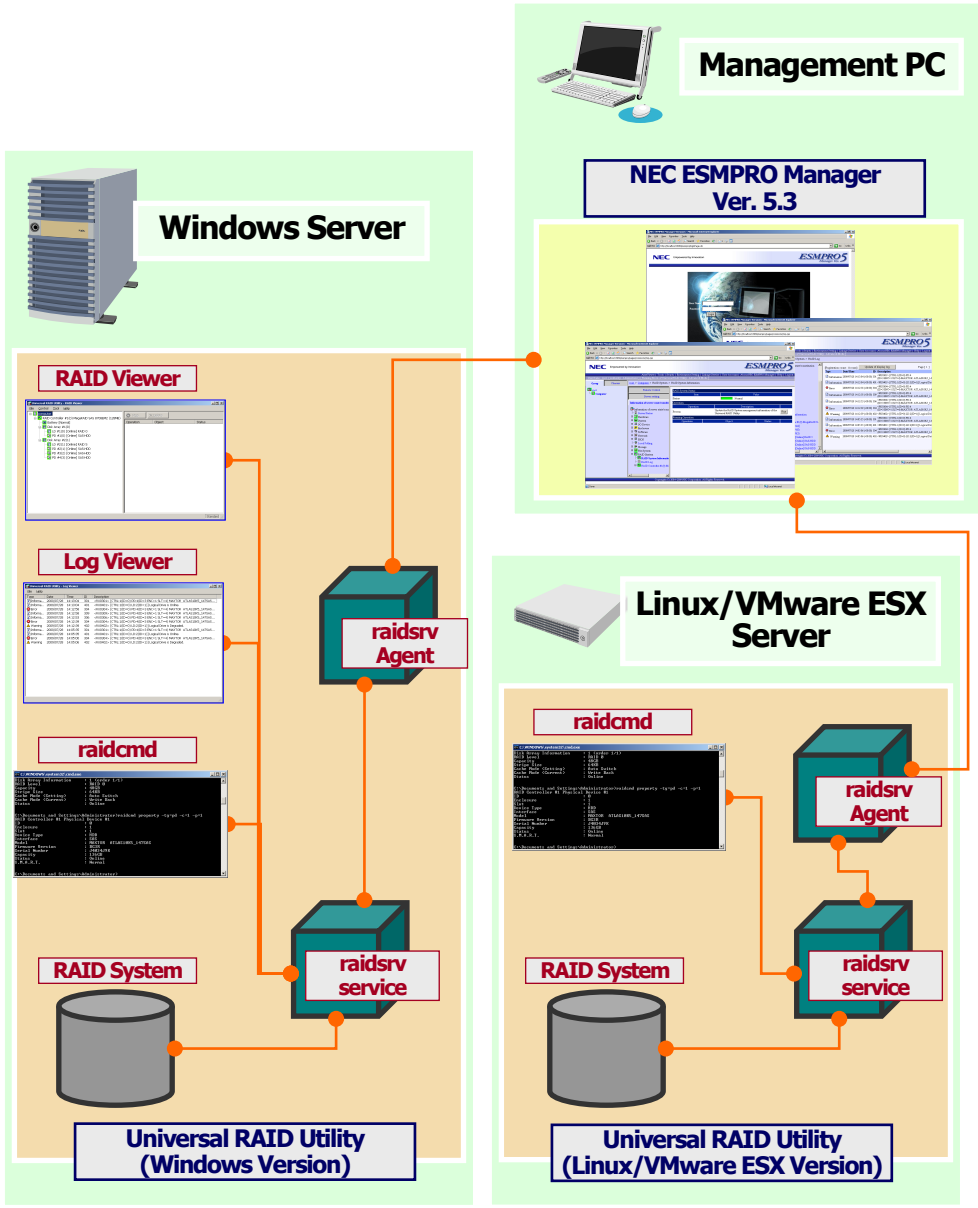


Figure 1 Configuration of Universal RAID Utility

Functional differences from previous version of Universal RAID Utility

Ver2.31 and Ver2.4

The following features have been enhanced and changed from Universal RAID Utility Ver2.31

1. Support of RAID System management on the Linux or VMware ESX server by NEC ESMPRO Manager Ver. 5.3 or later.
   Universal RAID Utility Linux Edition and VMware ESX Edition can manage RAID system using NEC ESMPRO Manager Ver. 5.3 or later of the remote environment.
2. Change of the version of NEC ESMPRO Manager which supports the function of RAID System management
   Universal RAID Utility Ver2.31 supports NEC ESMPRO Manager Ver. 4.0 or later. Universal RAID Utility Ver2.4 supports NEC ESMPRO Manager Ver. 5.3 or later.
   - End of Support (EOS) of NEC NEMPRO Agent ESMDiskArray

     End of Support (EOS) of NEC ESM Agent ESMDiskArray, because changing of version of NEC ESMPRO Manager which supports.
3. Addition of the following OS to support
   - Red Hat Enterprise Linux 6.0
   - Red Hat Enterprise Linux 5.6
   - Red Hat Enterprise Linux 4.9
   - SUSE Linux Enterprise Server 11 SP1
4. Addition of the hardware to support
   - Hard Disk Drive of capacity larger than 2TB
5. Operation
   - Support of fault monitoring of Hot Spare

     When Hot Spare is Failed, Universal RAID Utility notifies several logs of the event "Physical Device is Failed."
6. Display of information
   - Change of term of running mode

     The term "running mode" in Universal RAID Utility has been changed to "RAID System Management Mode".
   - Enhancement of Make Online / Make Offline

     When you execute Make Online / Make Offline, Universal RAID Utility displays a warning message in order not to corrupt the system by mistake.

System requirements

This chapter describes system requirements of the Universal RAID Utility.

Hardware

Computers

The computers can contain RAID Systems to be managed by the Universal RAID Utility.

RAID Systems to be managed by Universal RAID Utility

For RAID Systems which can be managed by the Universal RAID Utility, see the documentation attached to the computer in which RAID Systems are installed and that attached to the RAID Controller including the Universal RAID Utility.

Software (Windows)

Operating systems

The Universal RAID Utility can operate in the following operating systems.
It can operate in either 32-bit or 64-bit environment for any operating system.

- Windows Server 2008 R2
- Windows Server 2008
- Windows Server 2003 R2 SP1 or later
- Windows Server 2003 SP1 or later
- Windows 7
- Windows Vista
- Windows XP Professional SP2 or later
- Windows XP Professional x64 Edition SP1 or later

If you use "Server Core Install Option" of Windows Server 2008 or Windows Server 2008 R2, you can use raidcmd for the management of the RAID System only (You can not use RAID Viewer and Log Viewer).

Microsoft .NET Framework

To use the RAID Viewer and Log Viewer, Microsoft .NET Framework Version 2.0 or higher is required.
Windows Server 2008 and Windows Server 2008 R2, Windows Vista, Windows 7 include .NET Framework Version 2.0 or higher. Therefore, you do not need to install .NET Framework in case of using them.

For the installation of Microsoft .NET Framework Version 2.0 or higher, see "Preparing installation (Windows)".

Runtime component of Microsoft Visual C++ 2005 SP1 library

To use the RAID Viewer, the runtime component of the Microsoft Visual C++ 2005 SP1 library is required.
Windows Server 2008 R2 and Windows 7 include the runtime component of the Microsoft Visual C++ 2005 SP1 library. Therefore, you do not need to install the runtime component of the Microsoft Visual C++ 2005 SP1 library in case of using them as operating system.

For the installation of the runtime component of the Microsoft Visual C++ 2005 SP1 library, see "Preparing installation (Windows)".

Software (Linux)

Operating systems

The Universal RAID Utility can operate in the following operating systems.
It can operate in either 32-bit or 64-bit environment for any operating system.

- Red Hat Enterprise Linux 4.8 or later
- Red Hat Enterprise Linux 5.4 or later
- Red Hat Enterprise Linux 6.0
- MIRACLE LINUX V4.0 SP 2 or later
- Asianux Server 3
- SUSE Linux Enterprise Server 10 SP 3 or later
- SUSE Linux Enterprise Server 11 SP 1 or later

Software (VMware ESX)

VMware ESX

The Universal RAID Utility can operate in the following VMware ESX.

- VMware ESX 4.0 Update1 or later
- VMware ESX 4.1

You must install the Universal RAID Utility in the service console. Do not install in the virtual machine.

Others

Resources

Resource	Windows	Linux/VMware ESX
Available Hard Disk Space	250MB or more (not include Microsoft .NET Framework Ver2.0, the runtime of Microsoft Visual C++ 2005 SP1 library)	← (not include the required packages as standard C++ library...etc)
RAM	512MB or more	←

TCP ports used by Universal RAID Utility

The Universal RAID Utility uses the following three TCP ports.

TCP port	Description
52805	Data port
52806	Event port
52807	Communication port with NEC ESMPRO Manager

For the change of TCP port number using Universal RAID Utility, see "Changing TCP port number".

Safe Mode and Single User Mode

The Universal RAID Utility uses the network function. Accordingly, the Universal RAID Utility is unavailable in any of the following safe modes in which the network function cannot operate.

- Safe Mode
- Safe Mode with Command Prompt
- Safe Mode with Networking

Also, it cannot be used in the single user mode of Linux and VMware ESX. See "Starting Universal RAID Utility in Single User Mode" about how to use the Universal RAID Utility in the single user mode.

Setup of Universal RAID Utility

This chapter describes installation and uninstallation of the Universal RAID Utility.

Installation image

Use the setup program of Universal RAID Utility for the installation and the uninstallation.

The setup program is contained in the installation image of the Universal RAID Utility. Before the Universal RAID Utility can be installed or uninstalled, you must prepare the installation image.

The installation images of Universal RAID Utility are different by operating system. You need to use correct installation image corresponding to the operating system.

Operating system	Installation image
Windows Server 2008 R2 Windows Server 2008 Windows Server 2003 R2 SP1 or later Windows Server 2003 SP1 or later Windows 7 Windows Vista Windows XP SP2 or later Windows XP x64 SP1 or later	Universal RAID Utility (Windows Edition)
Red Hat Enterprise Linux 4.8 or later Red Hat Enterprise Linux 5.4 or later Red Hat Enterprise Linux 6.0 MIRACLE LINUX V4.0 SP2 or later Asianux Server 3 SUSE Linux Enterprise Server 10 SP3 or later SUSE Linux Enterprise Server 11 SP1 or later	Universal RAID Utility (Linux Edition)
VMware ESX 4.0 Update1 or later VMware ESX 4.1	Universal RAID Utility (VMware ESX Edition)

The installation images of Universal RAID Utility are attached to the computer or the RAID Controller.

The latest version of Universal RAID Utility is released on the “NEC Global Site” (http://www.nec.com/).

Installation and Uninstallation

This section describes the procedure of installation and uninstallation of Universal RAID Utility.

kind	Description
Installation	Install Universal RAID Utility newly, when there is not Universal RAID Utility in the computer. Procedure (Windows) 1. Preparing installation (Windows) 2. Installation (Windows) Procedure (Linux) 1. Preparing installation (Linux) 2. Installation (Linux, VMware ESX) Procedure (VMware ESX) 1. Installation (Linux, VMware ESX)
Update Installation	Install the new version of Universal RAID Utility, when there is the previous version of Universal RAID Utility in the computer Procedure (Windows) 1. Update Installation (Windows) Procedure (Linux, VMware ESX) 1. Update Installation (Linux, VMware ESX)
Uninstallation	Uninstall Universal RAID Utility from the computer. Procedure (Windows) 1. Uninstallation (Windows) Procedure (Linux, VMware ESX) 1. Uninstallation (Linux, VMware ESX)

IMPORTANT

- **A user having the administrator authority should install or uninstall the Universal RAID Utility in the computer. Only users having the administrator authority can execute the setup program.**
- **If you use "Server Core Install Option" of Windows Server 2008 or Windows Server 2008 R2, there is not [Start] menu. You must run setup.exe on the [Administrator : Command Prompt].**
- **If you use VMware ESX, press Alt key and F1 key at boot screen of VMware ESX to switch to service console. Log in to VMware ESX with administrator authority to install or uninstall Universal RAID Utility.**
- **Be sure to exit RAID Viewer, Log Viewer, raidcmd, and Event Viewer before uninstalling Universal RAID Utility.**

TIPS

The RAID log is not deleted at the uninstallation of Universal RAID Utility. You can refer the log files even after uninstalling Universal RAID Utility.

Preparing installation (Windows)

RAID Viewer and Log Viewer use Microsoft .NET Framework Version 2.0 or higher and the runtime component of the Microsoft Visual C++ 2005 SP1 library. Install these components if it does not exist in the computer where the Universal RAID Utility is to be installed.

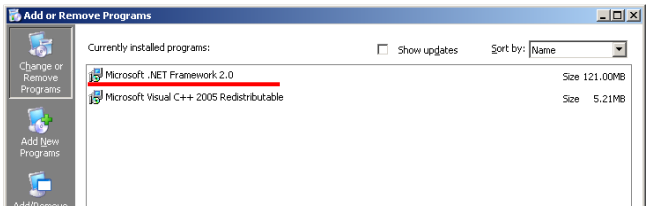
Installation of Microsoft .NET Framework

Windows Server 2008 and Windows Server 2008 R2, Windows Vista, Windows 7 include .NET Framework Version 2.0 or higher. Therefore, you do not need to install .NET Framework in case of using them as operating system.

Please be sure to install Microsoft .NET Framework Version between 2.0 and 3.5 for proper operation of Universal RAID Utility. Universal RAID Utility does not work properly only with Microsoft .NET Framework Version 4.0.

Step 1 Click [Start] - [Control Panel]. Then double-click [Add or Remove Program].

Step 2 Click [Change or Remove Program] to list [Currently installed programs]. If the following programs exist in the list of [Currently installed programs], Microsoft .NET Framework may not be installed. If the following packages do not exist, install the package(s).
- [Microsoft .NET Framework 2.0] (for x64, [Microsoft .NET Framework 2.0 (x64)])



Step 3 Microsoft .NET Framework Version 2.0 uses different packages depending on the CPU architecture. See the table below to download and install the required packages.

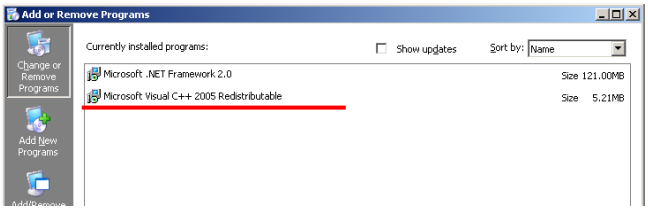
CPU architecture	Required components and their vendors
x86	[Microsoft .NET Framework Version 2.0 Redistributable Package (x86)] http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en
x64	[Microsoft .NET Framework Version 2.0 Redistributable Package (x64)] http://www.microsoft.com/downloads/details.aspx?familyid=92e0e1ce-8693-4480-84fa-7d85eef59016&displaylang=en

Installation of the runtime component of the Microsoft Visual C++ 2005 SP1 library

Windows Server 2008 R2 and Windows 7 include the runtime component of the Microsoft Visual C++ 2005 SP1 library. Therefore, you do not need to install the runtime component of the Microsoft Visual C++ 2005 SP1 library in case of using them as operating system.

Step 1 Click [Start] - [Control Panel]. Then double-click [Add or Remove Program].

Step 2 Click [Change or Remove Programs] to list [Currently installed programs]. If the following program exists in the list of [Currently installed programs], the runtime component of the Microsoft Visual C++ 2005 SP1 library may not be installed. If not, install it.
- [Microsoft Visual C++ 2005 Redistributable]



Step 3 For the runtime component of the Microsoft Visual C++ 2005 SP1 library, see the table below to download and install required packages.

CPU architecture	Required component and its vendor
x86/x64	[Microsoft Visual C++ 2005 Service Pack 1 Redistributable Package ATL Security Update] http://www.microsoft.com/downloads/details.aspx?familyid=766a6af7-ec73-40ff-b072-9112bab119c2&displaylang=en Use the vcredist_x86.exe whatever the CPU architecture may be.

IMPORTANT

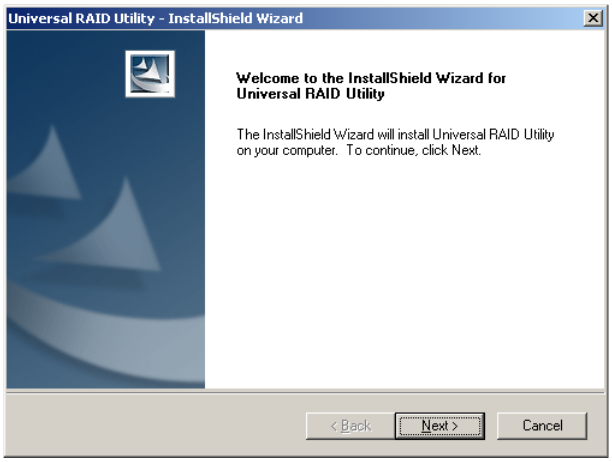
When you use RAID Viewer of Universal RAID Utility Ver2.3 or later, you need to install runtime component of the Microsoft Visual C++ 2005 SP1 library that ATL Security Update has already been applied. Install the runtime component of the Microsoft Visual C++ 2005 SP1 library to which ATL Security Update has been applied and then install Universal RAID Utility.

Installation (Windows)

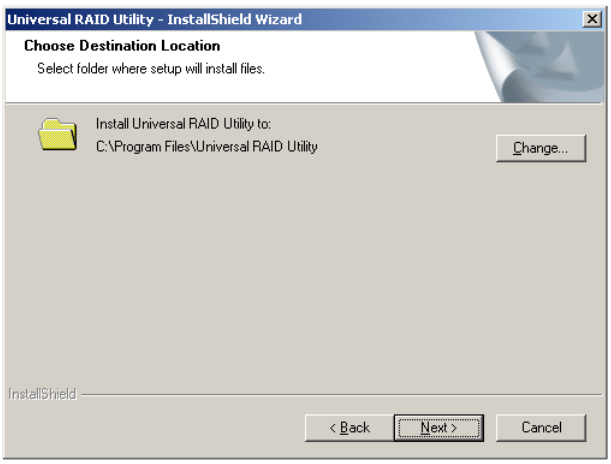
The Setup Program installs Universal RAID Utility when there is no Universal RAID Utility in the computer.

Step 1 Click [Start], [Run...], [Browse...]. Click setup.exe in the folder contained the installation image of Universal RAID Utility and click [Open] in the [Browse] dialog box. Recognize that displays "setup.exe" in [Name] box on [Run] dialog box and click [OK].

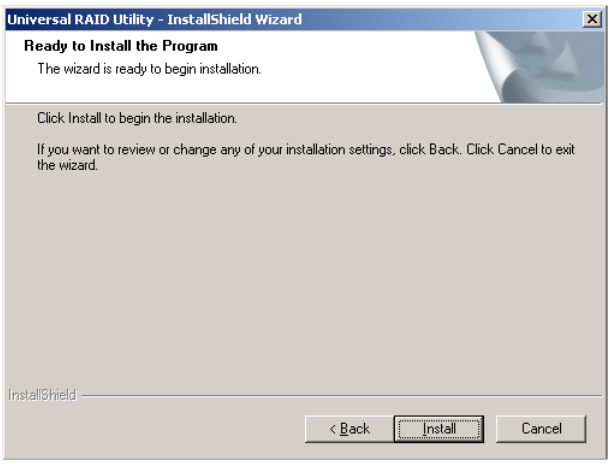
Step 2 The installation starts the InstallShield Wizard of the Universal RAID Utility. Click [Next].


Universal RAID Utility - InstallShield Wizard
Welcome to the InstallShield Wizard for Universal RAID Utility
The InstallShield Wizard will install Universal RAID Utility on your computer. To continue, click Next.
< Back
Next >
Cancel

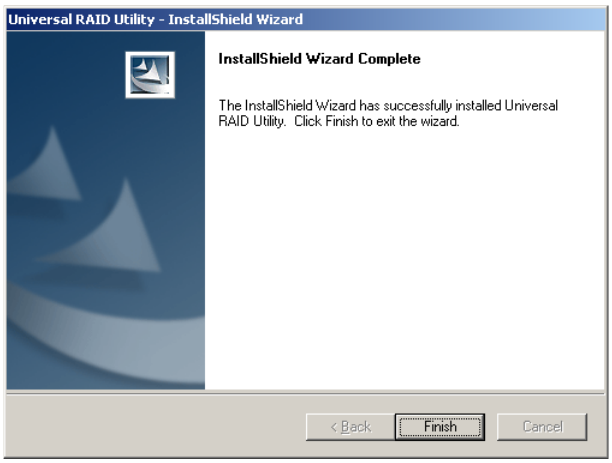
Step 3 The Universal RAID Utility is installed in \Program Files\Universal RAID Utility (or Program Files (x86) for x64) in the drive where the OS is started by default. To change the installation folder, click [Change] and enter another installation folder. Click [Next].



Next, the wizard appears as shown in the figure to the right. Click [Install] to start the installation.

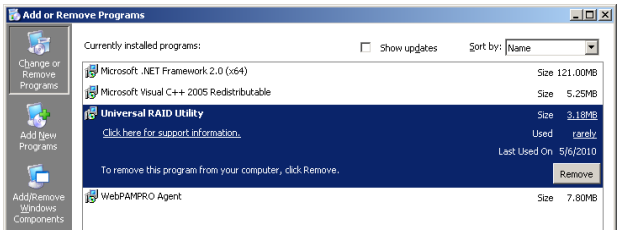

Universal RAID Utility - InstallShield Wizard
Ready to Install the Program
The wizard is ready to begin installation.
Click Install to begin the installation.
If you want to review or change any of your installation settings, click Back. Click Cancel to exit the wizard.
InstallShield
< Back
Install
Cancel

Step 4 At the completion of the installation, the wizard appears as shown in the figure to the right. Click [Finish].


Universal RAID Utility - InstallShield Wizard
InstallShield Wizard Complete
The InstallShield Wizard has successfully installed Universal RAID Utility. Click Finish to exit the wizard.
< Back
Finish
Cancel

Step 5 If installation completes, "Universal RAID Utility" is registered to the program list in the [Change or Remove Programs].
Also, either program or both programs to manage the RAID Controllers shown below will be registered depending on the type of the RAID Controller, the version of ESMPRO Manager, or the presence or absence of ESMPRO Manager.

- WebPAMPRO Agent



IMPORTANT

- **Do not uninstall "LSI SAS Storage SNMP Agent *X*" (*X* is version) in the list of [Add or Remove Program]. If you uninstall it, Universal RAID Utility cannot use normally.**
- **Please check the setting of [When maximum log size is reached] in the [Properties] of [System] event log. In case that [When maximum log size is reached] is not [Overwrite events as needed], when the log size reaches the maximum size, Universal RAID Utility cannot register the detected RAID event to the Windows Event Log and alert it to the NEC ESMPRO Manager. Please set [When maximum log size is reached] to the [Overwrite events as needed].**

IMPORTANT

If you need the addition of Universal RAID Utility, you must uninstall the previous version at first.
In the following cases, it is necessary to perform Add Install.

- Installing new RAID Controller in the computer.
- Removing RAID Controller from the computer.
- Installing or uninstalling NEC ESMPRO Manager which manages the computer.

When you reinstall Universal RAID Utility, the following settings are changed to the default settings. If you have changed these settings before reinstallation, you have to confirm the settings and change them again if required.

- TCP port using Universal RAID Utility
- The RAID System Management Mode of RAID Viewer and raidcmd
- The scheduled task of Consistency Check in task of operating system

Update Installation (Windows)

Universal RAID Utility Ver2.3 or later does not support Update Installation. If you need Universal RAID Utility update, you must uninstall previous version at first.
When you use RAID Viewer of Universal RAID Utility Ver2.3 or later, you need to install runtime component of the Microsoft Visual C++ 2005 SP1 library that ATL Security Update has already been applied.
For the installation of runtime component of the Microsoft Visual C++ 205 SP1 library with ATL Security Update applied, see “Preparing installation (Windows)”.
For the uninstallation of Universal RAID Utility, see "Uninstallation (Windows)".
When the following setting is changed, you have to change the setting again.

- TCP port using Universal RAID Utility
- The RAID System Management Mode of RAID Viewer and raidcmd
- The scheduled task of Consistency Check in task of operating system

Uninstallation (Windows)

The Setup Program uninstalls Universal RAID Utility when there is the same version of Universal RAID Utility in the computer.

TIPS

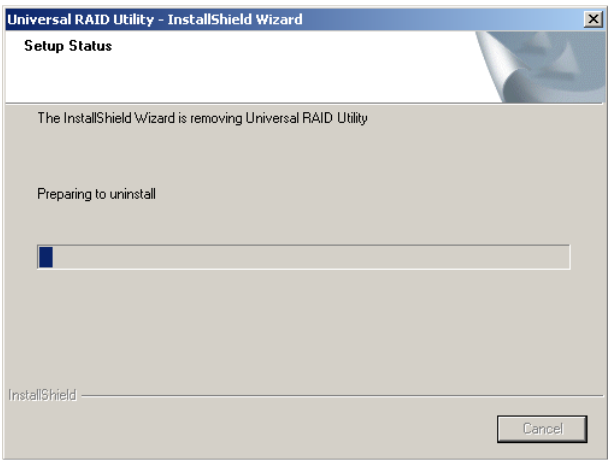
You can start the uninstallation by using the clicking [Delete] on "Universal RAID Utility" program in the list of [Add or Remove Program].

Step 1 See “Installation (Windows)” about the procedure of starting the setup program.

Step 2 The uninstallation starts the InstallShield Wizard of the Universal RAID Utility. The InstallShield Wizard of the Universal RAID Utility is started. Click [Yes] on the dialog box shown to the right to start the uninstallation. Click [No] to abort the setup program.

Universal RAID Utility - InstallShield Wizard
Do you want to completely remove the selected application and all of its features?
Yes
No

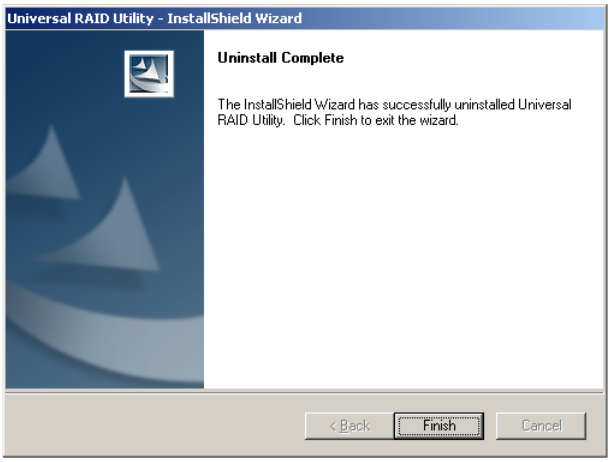
Step 3 Uninstallation begins. A right screen is displayed while uninstalling it.



Step 4 At the completion of the uninstallation, the wizard appears as shown in the figure to the right. Click [Finish].

If the uninstallation completes, "Universal RAID Utility" is deleted from the list of [Add or Remove Program].

Also, one or several programs to control RAID Controller in your system are deleted too.


Universal RAID Utility - InstallShield Wizard
Uninstall Complete
The InstallShield Wizard has successfully uninstalled Universal RAID Utility. Click Finish to exit the wizard.
< Back
Finish
Cancel

TIPS

When you run " Uninstallation " while any files to be uninstalled (deleted) have been in use, the setup program may request to restart the computer at the end of the uninstallation process. To complete uninstallation, restart the computer.

Preparing installation (Linux)

You must prepare the following packages for using the Universal RAID Utility. If the following packages do not exist in the computer that installs Universal RAID Utility, you need to install them.

- Red Hat Enterprise Linux 4.8 or later
  Red Hat Enterprise Linux 5.4 or later
  MIRACLE LINUX V4.0 SP 2 or later
  Asianux Server 3

packages	x86	x64
standard C++ library	libstdc++	libstdc++ (i386)
GCC 3.3.4 Compatibility standard C++ library	compat-libstdc++-33	compat-libstdc++-33 (i386)
GCC library	libgcc	libgcc (i386)
cron	vixie-cron	vixie-cron (x86_64)

- Red Hat Enterprise Linux 6.0

packages	x86	x64
standard C++ library	-	libstdc++ (i386)
GCC 3.3.4 Compatibility standard C++ library	compat-libstdc++-33	compat-libstdc++-33 (i386)
GCC library	-	libgcc (i386)
others	pciutils	pciutils glibc(i386) nss-softokn-freebl(i386)

- SUSE Linux Enterprise Server 10 SP3 or later
  SUSE Linux Enterprise Server 11 SP1 or later

packages	x86	x64
standard C++ library	libstdc++	libstdc++ (x86_64)
GCC 3.3.4 Compatibility standard C++ library	libstdc++33	libstdc++33-32bit (x86_64)
GCC library	libgcc	libgcc (x86_64)
cron	cron	cron (x86_64)

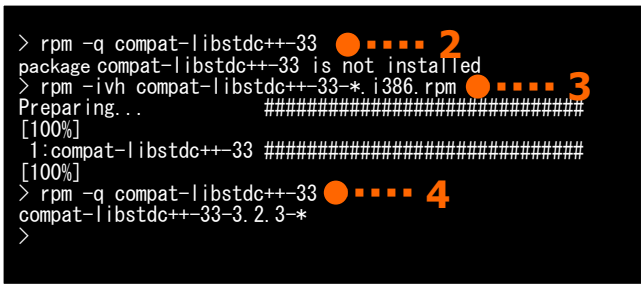
You can recognize the existence and install these packages by the following procedure (This procedure is example using GCC 3.3.4 Compatibility standard C++ library).

Step 1 You can check by rpm command which does GCC 3.3.4 Compatibility standard C++ library exist in the computer or not. If it has existed in your computer, rpm command displays the right way (the part of "*" is different by operating system). In this case, see "Installation (Linux, VMware ESX)". If it has not existed in your computer, rpm command displays the right way. In this case, install it to your computer.

```
> rpm -q compat-libstdc++-33 ●▪▪▪▪ 1
compat-libstdc++-33-3.2.3-*
>
```

Step 2 Log in to the computer with administrator authority to install Universal RAID Utility.
Insert the install disk of operating system included the "GCC 3.3.4 Comparability standard C++ library" to CD-ROM/DVD-ROM drive of your computer.

Step 3 Move current directory to the directory existed GCC 3.3.4 Compatibility standard C++ library, install it by rpm command (the part "*" is different by operating system).



Step 4 You can see the result of installation by rpm command. If the installation finishes, rpm command displays the below compat-libstdc++-33-3.2.3-*
(the part of "*" is different by operating system)
If the installation fails, rpm command does not display this package name.

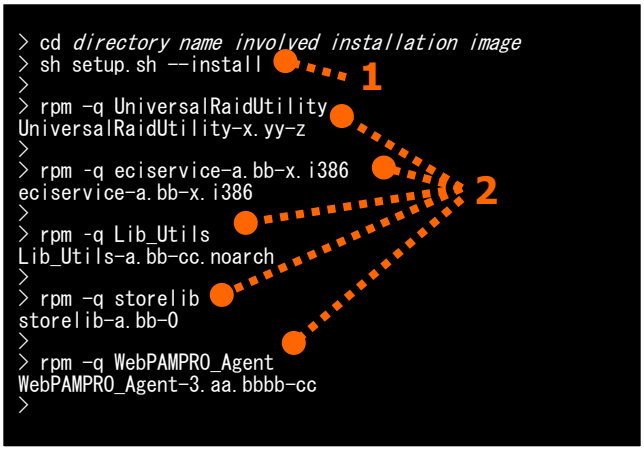
Installation (Linux, VMware ESX)

Use setup.sh in the installation image to install latest Universal RAID Utility.

You must install the Universal RAID Utility in the ESX Server. Do not install Universal RAID Utility in the virtual machine.

Step 1 Execute setup.sh in the installation image.
Change the current directory to the directory in which the installation image is stored and type as follows:
(In case of Linux)
sh setup.sh --install
(In case of VMware ESX)
sh setup.sh --install --reptblen

Step 2 At the end of setup.sh, the installation is completed. Check the result of the installation by using the rpm command. When the installation is completed properly, the following packages are installed:
- UniversalRAIDUtility-x.yy-z (x is major version, yy is minor version, z is revision number)
- eciservice-a.bb-x.i386 (a is major version, bb is minor version)
Also, the programs to manage the RAID Controllers will be installed with any one of the following combinations depending on the type of the RAID Controller used in your system.
- storelib-a.bb-0 (a.bb is version) and Lib_Utils-a.bb-cc.noarch (a.bb-cc is version)
- WebPAMPRO_Agent-3.aa.bbbb-cc (aa.bbbb-cc is version)
- storelib-a.bb-0 (a.bb is version), Lib_Utils-a.bb-cc.noarch (a.bb-cc is version) and WebPAMPRO_Agent-3.aa.bbbb-cc (aa.bbbb-cc is version)
If the installation fails, these packages do not exist in the computer.



Universal RAID Utility does not install the following packages in the VMware ESX environment. Please note that the installation is finished successfully in VMware ESX even after the program does not exist.

- storelib-a.bb-0. (a.bb is version)
- Lib_Utils-a.bb-cc.noarch (a.bb-cc is version)

IMPORTANT

If you need the addition of Universal RAID Utility, you must uninstall the previous version at first.
In the following cases, it is necessary to perform Add Install.

- Installing new RAID Controller in the computer.
- Removing RAID Controller from the computer.
- Installing or uninstalling NEC ESMPRO Manager which manages the computer.

When you reinstall Universal RAID Utility, the following settings are changed to the default settings. If you have changed these settings before reinstallation, you have to confirm the settings and change them again if required.

- TCP port using Universal RAID Utility
- The RAID System Management Mode of RAID Viewer and raidcmd
- The scheduled task of Consistency Check in task of operating system

Update Installation (Linux, VMware ESX)

Universal RAID Utility Ver2.3 or later does not support Update Installation. If you need Universal RAID Utility update, you must uninstall previous version at first.
For the uninstallation of Universal RAID Utility, see "Uninstallation (Linux, VMware ESX)".
When the following setting is changed, you have to change the setting again.

- TCP port using Universal RAID Utility
- The RAID System Management Mode of RAID Viewer and raidcmd
- The scheduled task of Consistency Check in task of operating system

Uninstallation (Linux, VMware ESX)

Use setup.sh in the installation image to uninstall Universal RAID Utility.

Step 1 Execute setup.sh in the installation image.
Change the current directory to the directory in which the installation image is stored and type as follows:
sh setup.sh --uninstall

Step 2 At the end of setup.sh, the uninstallation is completed. Check the result of the uninstallation by using the rpm command. When the uninstallation is completed properly, the following package is uninstalled:
- UniversalRaidUtility-x.yy-z (x is major version, yy is minor version, z is revision number)
- eciservice-a.bb-x.i386 (a is major version, bb is minor version,)
Also, one or several packages to control RAID Controller are uninstalled too.

CHECK

If other application is using "eciservice-a.bb-x.i386" (a is major version, bb is minor version), "eciservice-a.bb-x.i386" (a is major version, bb is minor version) is not uninstalled. Please note that the uninstallation is finished successfully even if the program exists in this case.

Starting or Stopping Universal RAID Utility

This chapter describes the procedure of starting or stopping each module in the Universal RAID Utility.

raidsrv service

The raidsrv service is started automatically when your computer is booted and stopped automatically when your computer is shut down.
Without operation of the raidsrv service, the Universal RAID Utility cannot operate normally. Neither makes the raidsrv service be not started nor stop the raidsrv service.

> IMPORTANT
>
> **In case that the operating system is Linux or VMware ESX, if the raidsrv service terminates abnormally due to an error or the process of the raidsrv service is terminated forcibly, the lock file for avoiding double starts is left. If the state remains, the raidsrv service may not be started.**
>
> **If this occurs, delete the following file before restarting the raidsrv service:**
> **/var/lock/subsys/raidsrv**

Starting Universal RAID Utility in Single User Mode

The Universal RAID Utility uses network functions. Accordingly, the Universal RAID Utility cannot be used in the single user mode of Linux and VMware ESX without network functions. To use the Universal RAID Utility in the single user mode, first enable the network functions in the following procedure and start the raidsrv service.

Step 1 Start the network service.

Step 2 Start the raidsrv service.

Step 3 Check that the raidsrv service is started normally. If a process ID appears, the raidsrv service is started normally.

raidsrv Agent Service

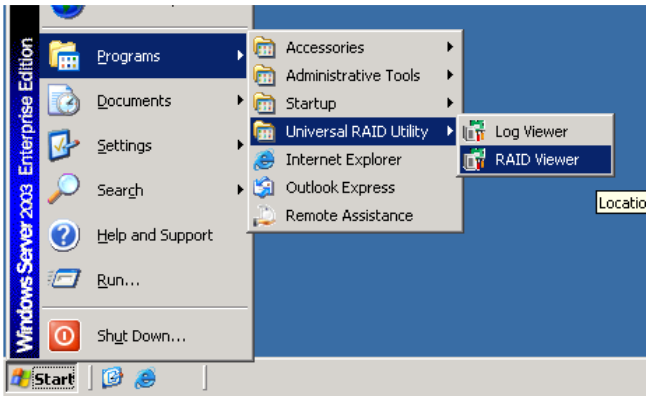
The raidsrv Agent service is started automatically when your computer is booted and stopped automatically when your computer is shut down.
Without operation of the raidsrv service, Universal RAID Utility cannot be communicated with NEC ESMPRO Manager
Neither make the raidsrv service be not started nor stop the raidsrv service.

> IMPORTANT
>
> - **In case that the operating system is Linux or VMware ESX, if the raidsrv Agent Service terminates abnormally due to an error or the process of the raidsrv Agent Service is terminated forcibly, the lock file for avoiding double starts is left. If the state remains, the raidsrv Agent Service may not be started.**
>   **If this occurs, delete the following file before restarting the raidsrv Agent Service:**
>   **/var/lock/subsys/raidsrv_agent**
> - **raidsrv Agent service can not use in Single User Mode.**

RAID Viewer

Use [Start] menu to open the RAID Viewer.

Click [Start], and point menu in order to [Programs], [Universal RAID Utility] and [RAID Viewer].



IMPORTANT

- **To use the RAID Viewer, you should log on to the computer as a user having the administrator authority. Only users having the administrator authority can execute the RAID Viewer.**
- **When you start the RAID Viewer on the computer not connected to internet,, may wait a few minutes until startup the RAID Viewer. See "Verification of Authenticode signature at the startup of the RAID Viewer and Log Viewer" for detail.**

CHECK

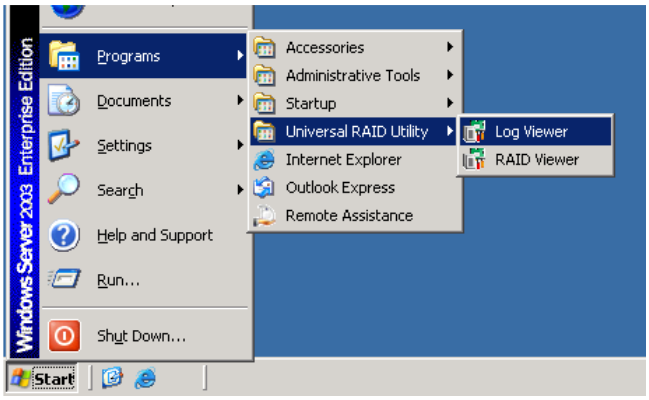
- Only a single RAID Viewer can be started at a time.
- The RAID Viewer cannot be started if the raidsrv service does not operate. An error may occur if the RAID Viewer is started just after the start of the OS. It is because the raidsrv service has not been started completely. In this case, wait for a while before restarting the RAID Viewer.

Select [File] on the Menu Bar of the RAID Viewer and click [Exit] to close the RAID Viewer.

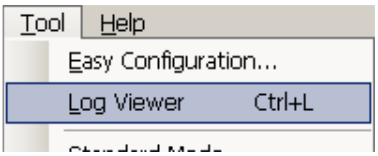
Log Viewer

Use [Start] menu to open the Log Viewer.

Click [Start], and point menu in order to [Programs], [Universal RAID Utility], [Log Viewer].



Or select [Tool] menu of the RAID Viewer and click [Log Viewer].



IMPORTANT

- **To use the Log Viewer, you should log on to the computer as a user having the administrator authority. Only users having the administrator authority can execute the Log Viewer.**
- **When start the Log Viewer on the computer not connected to internet, may wait a few minutes until startup the Log Viewer. See "Verification of Authenticode signature at the startup of the RAID Viewer and Log Viewer" for detail.**

CHECK

Only a single Log Viewer can be started at a time.

Select [File] on the Menu Bar of the Log Viewer and click [Exit] to close the Log Viewer.

raidcmd

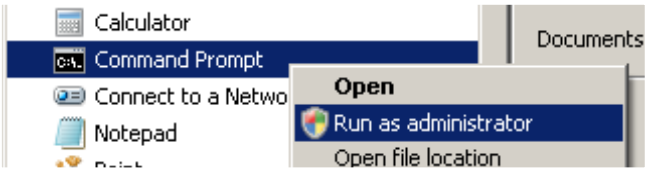
raidcmd is command on console as "Command Prompt" in Windows and console (terminal) in Linux and VMware ESX. The raidcmd is executed on a console. Use the raidcmd by the methods described in "Functions of raidcmd".

IMPORTANT

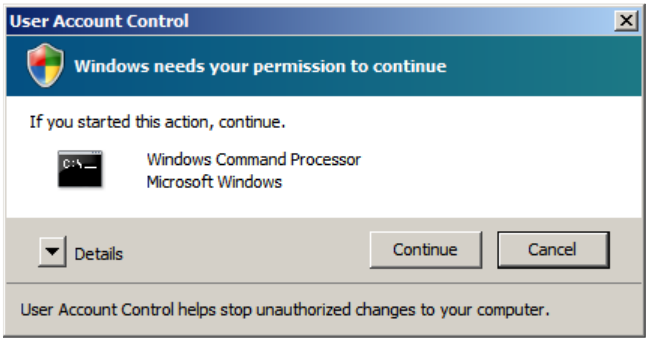
- **A user having the administrator authority should run the raidcmd. Only users having the administrator authority can execute the raidcmd.**
- **In case of the operating system is Linux or VMware ESX, the raidcmd can't start by existing the lock file after aborted it. If you start the raidcmd when the lock file exists, the raidcmd displays the following message.**
  raidcmd:<RU4009> The raidcmd command is already running.
  Delete the lock file (/var/lock/subsys/raidcmd), if the raidcmd displays this message when some processes of the raidcmd do not execute at same time,

In case of the operating system is Windows Server 2008 or Windows Server 2008 R2 , Windows Vista, Windows 7, you must use "[Administrator: Command Prompt]" for running raidcmd. If you use normal Command Prompt, you cannot see the message of raidcmd because of raidcmd runs in the another "[Administrator: Command Prompt]" . You can use "[Administrator: Command Prompt]" by the following procedure.

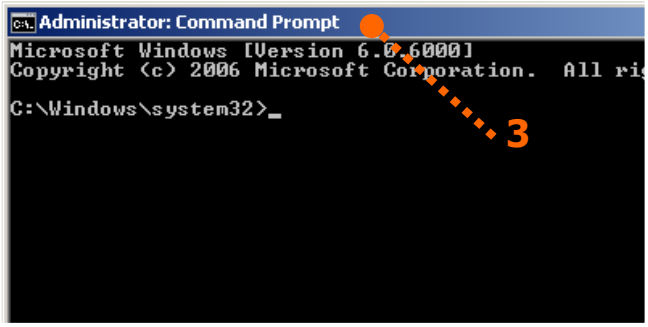
Step 1 Click [Start] menu, and point menu in order to [Programs], [Accessories], [Command Prompt], click [Run as administrator] on shortcut menu.



Step 2 The operating system may display [User Account Control] dialog box after clicked [Run as Administrator]. If you want to run the raidcmd, click [Continue].



Step 3 [Administrator: Command Prompt] will start soon. You should check the window title is "[Administrator: Command Prompt]". You can use raidcmd on [Administrator: Command Prompt].



Standard and Advanced Modes

The RAID Viewer and raidcmd can operate in two RAID System Management Modes, which are Standard Mode and Advanced Modes.
The Standard Mode provides the RAID Viewer and raidcmd with standard management functions for RAID Systems.
The Advanced Mode provides the RAID Viewer and raidcmd with advanced management and maintenance functions for RAID Systems.
Using the two RAID System Management Modes appropriately depending on users and jobs allows the usability of the RAID Viewer to be improved and malfunctions to be avoided.
The table below lists the functions of the RAID Viewer and raidcmd available in each mode.

Function	RAID Viewer function	raidcmd command	Standard mode	Advanced mode
Update display information	Rescan	rescan	✓	✓
See property	Property	property	✓	✓
Create Logical Drive (simple)	Create Logical Drive (Simple)	mklds	✓	✓
Create Logical Drive (custom)	Create Logical Drive (Custom)	mkldc		✓
Silence Buzzer	Silence Buzzer	sbuzzer	✓	✓
Consistency Check (start)	Consistency Check	cc	✓	✓
Consistency Check (stop)	[Stop] on Operation View	cc	✓	✓
Consistency Check (start) for schedule running	NA	ccs	✓	✓
Initialize (start)	Initialize	init		✓
Initialize (stop)	[Stop] on Operation View	init		✓
Delete Logical Drive	Delete Logical Drive	delld		✓
Rebuild (start)	Rebuild	rebuild		✓
Rebuild (stop)	[Stop] on Operation View	rebuild		✓
Hot Spare (make)	Make Hot Spare	hotspare	✓	✓
Hot Spare (remove)	Remove Hot Spare	hotspare	✓	✓
Change Status of Physical Device (Online)	Make Online	stspd		✓
Change Status of Physical Device (Failed)	Make Offline	stspd		✓
Location of Physical Device	Locate (Lamp)	slotlamp	✓	✓
Easy Configuration	Easy Configuration	econfig	✓	✓
Start Log Viewer	Log Viewer	NA	✓	✓
Change RAID System Management Mode	Standard Mode Advanced Mode	runmode	✓	✓
See the version	About... in [Help] menu	run raidcmd without command	✓	✓
See status of operation	Operation View	oplist	✓	✓
Set option parameters of RAID Controller	Property of RAID Controller	optctrl		✓
Set option parameters of Logical Drive	Property of Logical Drive	optld		✓

RAID System Management Mode when startup RAID Viewer and raidcmd

RAID Viewer

RAID Viewer always starts with Standard Mode. You can change the RAID System Management Mode when RAID Viewer starts. See "Changing RAID System Management Mode at Start of RAID Viewer".

raidcmd

raidcmd starts with Standard Mode at first after installing Universal RAID Utility. If you want to change the RAID System Management Mode, you must to use "**runmode**" command (The RAID System Management Mode does not change the mode when restart the computer).

Changing RAID System Management Mode

The procedure of changing the RAID System Management Mode is below.

RAID Viewer

Use [Advanced Mode] or [Standard Mode] in [Tool] menu.

See "[Tool] menu" for detail.

raidcmd

Use "**runmode**" command.

Step 1 If you want to change from Standard Mode to Advanced Mode, run "**runmode**" command with -md=a parameter.

Step 2 If you want to change from Advanced Mode to Standard Mode, run "**runmode**" command with -md=s parameter.

Functions of RAID Viewer

This chapter describes the functions of the RAID Viewer.

Structure of RAID Viewer

As shown in the figure below, the RAID Viewer is composed of four parts, or Tree View, Operation View, Menu Bar and Status Bar.

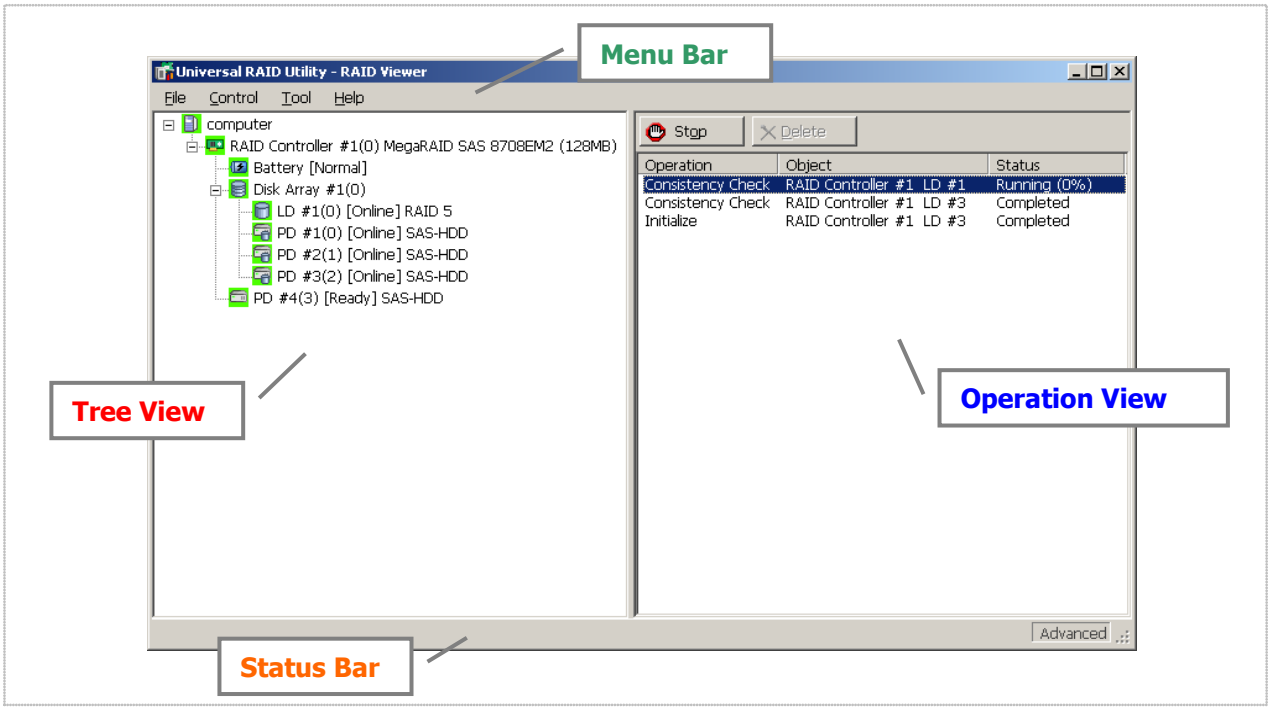
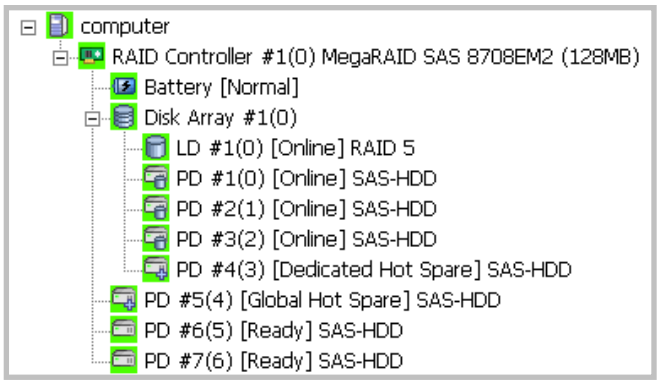


Figure 2 Structure of RAID Viewer

Tree View

The Tree View indicates the configuration of RAID Systems managed by the Universal RAID Utility existing in your computer hierarchically. The Tree View also indicates the types and status of components with relevant icons.

The Tree View displays each RAID System existing in your computer as a RAID Controller node.
Each RAID Controller node has the node of a Battery on RAID Controller, created all Logical Drives and Disk Array and connected all Physical Devices. A single node includes at least a single component of each type.
Every component is accompanied by an icon. The icons indicate the type and the status of each component (computer, RAID Controller, Battery, Logical Drive, and Physical Device) graphically.


computer
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
PD #5(4) [Global Hot Spare] SAS-HDD
PD #6(5) [Ready] SAS-HDD
PD #7(6) [Ready] SAS-HDD

Computer

The first level node shows the computer in which the Universal RAID Utility operates.
The computer icon indicates the status of the RAID Systems existing in the computer totally.

Icon	Meaning	Description
	Computer - Normal	All RAID Systems in the computer operate normally. Problems which RAID Controllers define as failures do not occur.
	Computer - Warning	One or more RAID Systems of the following status exist in the computer: "Containing one or more failed components but being operable"
	Computer - Fatal	One or more RAID Systems of the following status exist in the computer: "Containing one or more failed components and being inoperable"

RAID Controller

Each RAID System on the computer is the RAID Controller node. A RAID Controller node equals a RAID Controller, and shows the number, ID and model of the RAID Controller.
A RAID Controller icon indicates the status of the RAID System on the RAID Controller totally.

Icon	Meaning	Description
	RAID Controller - Normal	The all of components(Battery, Logical Drive, Physical Device) operates normally on the RAID Controller. Problems which the RAID Controller detects as failures do not occur.
	RAID Controller - Warning	One or more components of the following status exist on the RAID Controller : "Containing one or more failed components but being operable"
	RAID Controller - Fatal	One or more components of the following status exist in the RAID Controller : "Containing one or more failed components and being inoperable"

Battery

If the RAID Controller has the Battery, the RAID Controller node has a Battery node. A Battery node and icon shows the status of Battery.

Icon	Meaning	Description
	Battery - Normal	The Battery operates normally.
	Battery - Warning	The RAID Controller detects any problem of the Battery.

Disk Array

If there are some Logical Drive in the RAID Controller, the RAID Controller node has the Disk Array nodes included the Logical Drives. The Disk Array node equals a Disk Array, and shows the number and ID of the Disk Array. Also, the created some Logical Drives, consisted of all Physical Devices and created some Dedicated Hot Spares exist in the Disk Array node. A Disk Array icon indicates the status of these totally.

Icon	Meaning	Description
	Disk Array - Normal	The created all Logical Drives, consisted of all Physical Devices and created all Dedicated Hot Spares operates normally. Problems which the RAID Controller detects as failures do not occur.
	Disk Array - Warning	These are some components which the status is Warning.
	Disk Array - Fatal	These are some components which the status is Fatal or Warning.

Logical Drive

The Logical Drive node exists in the Disk Array node. A Logical Drive node equals a Logical Drive, and shows the number, ID, status and RAID Level of the Logical Drive. A Logical Drive icon indicates the status of the Logical Drive.

Icon	Meaning	Description
	Logical Drive - Normal	The Logical Drive operates normally.
	Logical Drive - Warning	Because the Logical Drive contains one or more Physical Devices with [Status] being [Failed], the redundancy of the Logical Drive is lost or degraded.
	Logical Drive - Fatal	Because the Logical Drive contains one or more Physical Devices with [Status] being [Failed], the Logical Drive is offline and accessing to the Logical Drive is disabled.

A Logical Drive is created by two or more Disk Arrays according to the kind of the RAID Controller. In this case, there are the nodes of a Logical Drive exist in two of more the nodes of Disk Arrays.

Physical Device

The Physical Device node exists in either the Disk Array node or the RAID Controller node. The Physical Device which has created the Logical Drive and created Dedicated Hot Spare exists in the Disk Array node. The other Physical Device exists in RAID Controller node. The Physical Device node equals a Physical Device, and shows the number, ID, status and device type of the Physical Device.
A Physical Device icon indicates the device type and the status of the Physical Device.

Icon	Meaning	Description
	Physical Device - Ready	The Physical Device is not used to create a Logical Drive yet.
	Physical Device - Online	The Physical Device is already used to create a Logical Drive. Problems which the RAID Controller detects as failures do not occur.
	Physical Device - Hot Spare	The Physical Device is registered as a Hot Spare.
	Physical Device - Rebuilding	The Physical Device which is rebuilding now.
	Physical Device - Warning	The Physical Device which detects one or more S.M.A.R.T. errors.
	Physical Device - Fatal	The Physical Device which is detected a failure by RAID Controller.
	Tape Drive	The Physical Device which device type is [Tape Drive].
	CD Drive/DVD Drive	The Physical Device which device type is [CD/DVD].

The nodes of Dedicated Hot Spare created to two or more Disk Arrays existed in each node of Disk Array.

Shortcut Menu

Right-clicking the node of RAID Controller, Disk Array, Logical Drive, Physical Device and Battery allows the shortcut menu to appear. On the shortcut menu, you can display the property and execute the something operation. See "Menu Bar" for detail of each function.

Operation View

The Operation View indicates the status and results of operations executed in the computer after the RAID Viewer is started.

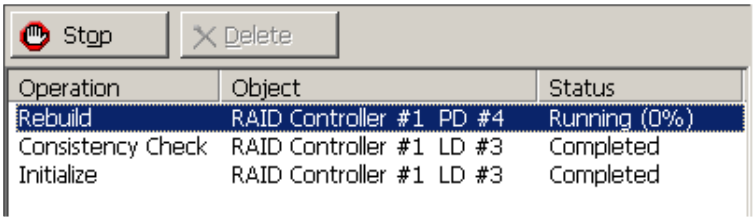


Figure 3 Operation View

The following operations may appear on the Operation View. For each operation, the target component and the status of the operation appear.

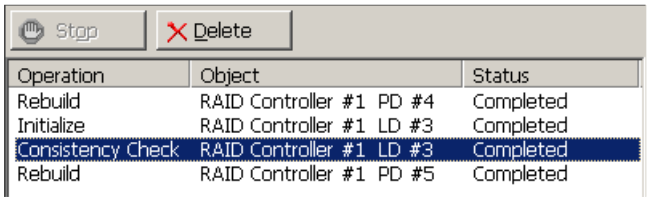
- Initialize
- Rebuild
- Consistency Check

Operations being executed while the RAID Viewer is started and those started after the RAID Viewer is started are listed. You can see the status and result of operations by the value of [Status].

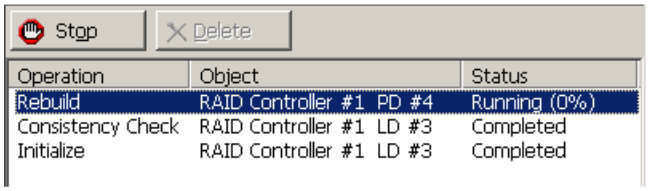
Status	Description
Running (*N* %)	The operation is running (*N* is progress).
Completed	The operation completed.
Failed	The operation failed.
Stopped	The operation stopped (by [Stop]).
Paused (*N* %)	The operation is paused (*N* is progress).
Queued (*N* %)	The operation is queued (*N* is progress).
Stop Processing	The operation is being stopped (by [Stop]).

Terminated operations continue to appear until the RAID Viewer is closed. However, the terminated operations will not appear at the next start of the RAID Viewer.

To delete an operation terminated while the RAID Viewer is started, click the operation to be deleted and [Delete].



An operation being executed can be stopped on the way. To do this, click the operation to be stopped and [Stop].



CHECK

- Operations allowed to be stopped vary depending on RAID System Management Modes. See "Standard and Advanced Modes" for details.
- The stop of the operation might not be supported according to the kind of RAID Controller. In that case, the [Stop] does not become effective.

When progress is frequently updated such as initializing a Logical Drive with extremely small capacity, the progress of [Status] might not be able to be displayed correctly. Correct progress is displayed when [Rescan] in [File] menu is run at such time.

Menu Bar

The RAID Viewer has four menu items on the Menu Bar, or [File], [Control], [Tool] and [Help].

Figure 4 Menu of RAID Viewer

The following describes the menu items.

- **With the RAID System Management Mode of the RAID Viewer being "Standard", the functions unavailable in the Standard Mode do not appear on the pull-down menus of the menu items.**
- **Depending on the type or status of the target component selected on the Tree View, some menu items cannot be executed. If so, clicking such a menu item is disabled.**

[File] menu

[File] menu includes items for updating the display information on the RAID Viewer, displaying the property of each component, and terminating the RAID Viewer.

Menu item	Description
[Rescan]	The Universal RAID Utility acquires the configuration and state information from all of RAID System again, and updates the management information by them. The RAID Viewer displays the newest information.
[Properties...]	Indicates the property of the component selected on the Tree View (RAID Controller, Battery, Disk Array, Logical Drive or Physical Device).
[Exit]	Closes the RAID Viewer.

[Control] menu

[Control] menu includes items for operating RAID Controllers, Logical Drives, and Physical Devices. To use a function subordinate to [Control] menu, first click the target component on the Tree View and select the menu item to be executed from the pull-down menu.
Some functions of [Control] menu may be disabled depending on the type or status of the selected component. If the RAID System Management Mode of the RAID Viewer is set to the Standard Mode, the functions restricted in the Standard Mode are disabled. See "Standard and Advanced Modes" for the functions available depending on RAID System Management Modes.

Functions executable by RAID Controller

Menu item	Description
[Create Logical Drive]	Creates a Logical Drive in the selected RAID Controller. [Create Logical Drive] has two modes, [Simple] and [Custom]. In the [Simple] mode, a Logical Drive can be simply created only by selecting a RAID Level and Physical Devices. In the [Custom] mode, a Logical Drive can be created by specifying detailed settings.
[Silence Buzzer]	Stops the Buzzer in the RAID Controller.

Functions executable for Logical Drive

Menu item	Description
[Consistency Check]	Executes Consistency Check for the selected Logical Drive.
[Initialize]	Initializes the selected Logical Drive. [Initialize] has two modes, [Full] and [Quick]. In the [Full] mode, initializes the entire area of a Logical Drive. In the [Quick] mode, initializes only several leading blocks including the information on managing a Logical Drive.
[Delete Logical Drive]	Deletes the selected Logical Drive.

Functions executable for Physical Device

Menu item	Description
[Rebuild]	Rebuilds the selected Physical Device.
[Hot Spare]	Makes a Hot Spare with the selected Physical Device or removes a Hot Spare. [Make Global Hot Spare] makes Physical Devices be Global Hot Spares available as Hot Spares of all Logical Drives in the relevant RAID System. [Make Dedicated Hot Spare...] makes Physical Devices be Dedicated Hot Spares available as Hot Spares of specific Logical Drives. [Remove Hot Spare] removes Physical Devices from Hot Spares.
[Make Online]	Sets the selected Physical Device to online.
[Make Offline]	Sets the selected Physical Device to offline.
[Locate(Lamp)]	Goes on (or blinks) the lamp on the slot where the selected Physical Device is installed. [ON] goes on (or blinks) the lamp. [OFF] goes off the lamp.

[Tool] menu

[Tool] menu includes tools used to manage RAID Systems and items for changing the operation of the RAID Viewer.

Menu item	Description
[Easy Configuration...]	Executes Easy Configuration allowing a RAID System to be configured easily.
[Log Viewer]	Starts the Log Viewer.
[Advanced Mode] or [Standard Mode]	Alters the RAID System Management Mode. The item varies depending on the RAID System Management Mode. [Advanced Mode] sets the RAID System Management Mode to the Advanced Mode. [Standard Mode] sets the RAID System Management Mode to the Standard Mode.
[Option...]	Allows you to provide settings for the Universal RAID Utility.

[Help] menu

[Help] menu includes the item of indicating the version and revision of the Universal RAID Utility and the version of the RAID Viewer.

Menu item	Description
[About...]	Indicates the version and revision of the Universal RAID Utility and the version of the RAID Viewer.

Status Bar

The Status Bar indicates the current RAID System Management Mode of the RAID Viewer.

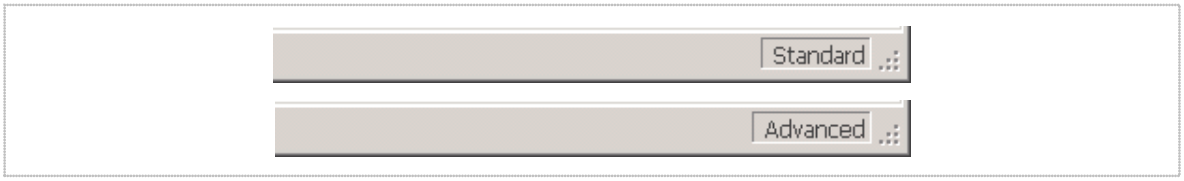


Figure 5 Status Bar of RAID Viewer

Functions of Log Viewer

This chapter describes the functions of the Log Viewer.

Structure of Log Viewer

As shown in the figure below, the Log Viewer is composed of three parts, or Log View, Menu Bar and Status Bar.

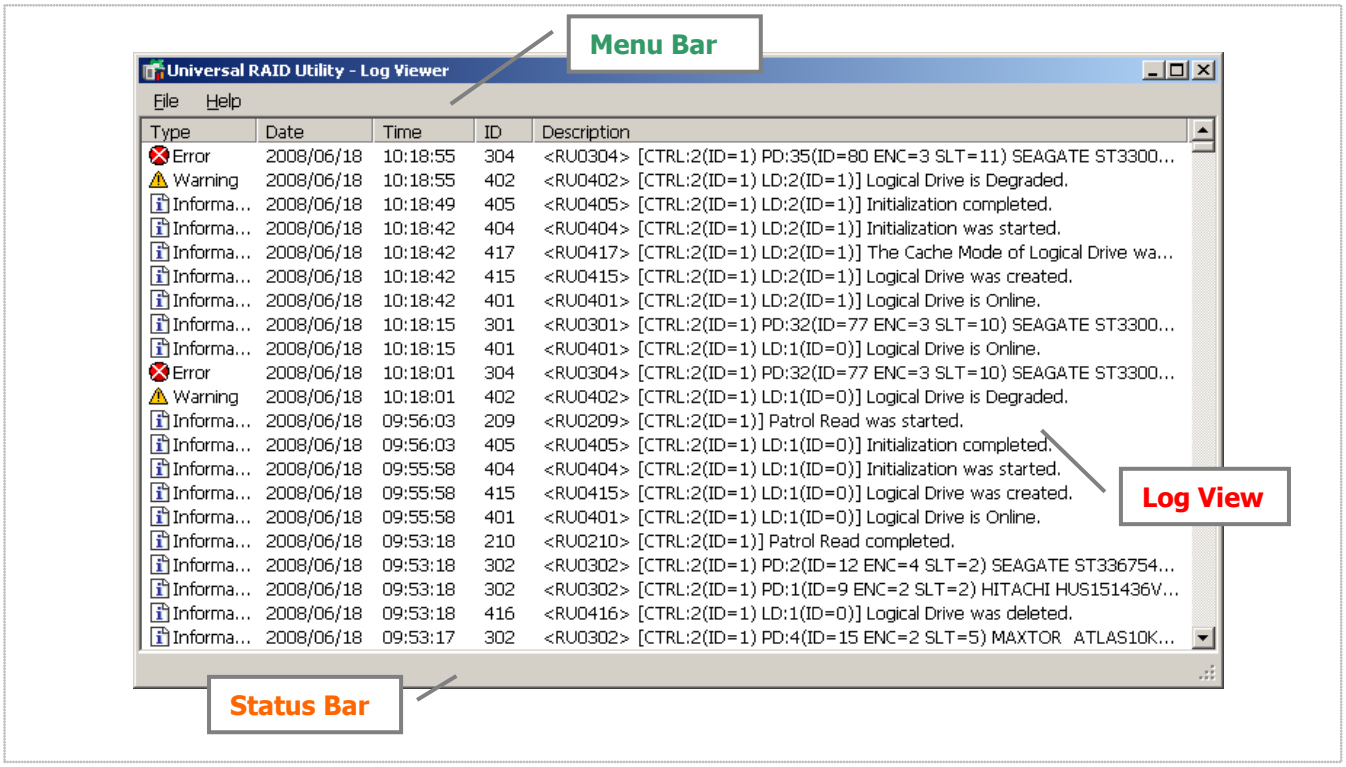

Menu Bar
Universal RAID Utility - Log Viewer
File Help
Type Date Time ID Description
Error 2008/06/18 10:18:55 304 <RU0304> [CTRL:2(ID=1) PD:35(ID=80 ENC=3 SLT=11) SEAGATE ST3300...
Warning 2008/06/18 10:18:55 402 <RU0402> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive is Degraded.
Informa... 2008/06/18 10:18:49 405 <RU0405> [CTRL:2(ID=1) LD:2(ID=1)] Initialization completed.
Informa... 2008/06/18 10:18:42 404 <RU0404> [CTRL:2(ID=1) LD:2(ID=1)] Initialization was started.
Informa... 2008/06/18 10:18:42 417 <RU0417> [CTRL:2(ID=1) LD:2(ID=1)] The Cache Mode of Logical Drive wa...
Informa... 2008/06/18 10:18:42 415 <RU0415> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive was created.
Informa... 2008/06/18 10:18:42 401 <RU0401> [CTRL:2(ID=1) LD:2(ID=1)] Logical Drive is Online.
Informa... 2008/06/18 10:18:15 301 <RU0301> [CTRL:2(ID=1) PD:32(ID=77 ENC=3 SLT=10) SEAGATE ST3300...
Informa... 2008/06/18 10:18:15 401 <RU0401> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Online.
Error 2008/06/18 10:18:01 304 <RU0304> [CTRL:2(ID=1) PD:32(ID=77 ENC=3 SLT=10) SEAGATE ST3300...
Warning 2008/06/18 10:18:01 402 <RU0402> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Degraded.
Informa... 2008/06/18 09:56:03 209 <RU0209> [CTRL:2(ID=1)] Patrol Read was started.
Informa... 2008/06/18 09:56:03 405 <RU0405> [CTRL:2(ID=1) LD:1(ID=0)] Initialization completed.
Informa... 2008/06/18 09:55:58 404 <RU0404> [CTRL:2(ID=1) LD:1(ID=0)] Initialization was started.
Informa... 2008/06/18 09:55:58 415 <RU0415> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive was created.
Informa... 2008/06/18 09:55:58 401 <RU0401> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive is Online.
Informa... 2008/06/18 09:53:18 210 <RU0210> [CTRL:2(ID=1)] Patrol Read completed.
Informa... 2008/06/18 09:53:18 302 <RU0302> [CTRL:2(ID=1) PD:2(ID=12 ENC=4 SLT=2) SEAGATE ST336754...
Informa... 2008/06/18 09:53:18 302 <RU0302> [CTRL:2(ID=1) PD:1(ID=9 ENC=2 SLT=2) HITACHI HUS151436V...
Informa... 2008/06/18 09:53:18 416 <RU0416> [CTRL:2(ID=1) LD:1(ID=0)] Logical Drive was deleted.
Informa... 2008/06/18 09:53:17 302 <RU0302> [CTRL:2(ID=1) PD:4(ID=15 ENC=2 SLT=5) MAXTOR ATLAS10K...
Log View
Status Bar

Figure 6 Structure of Log Viewer

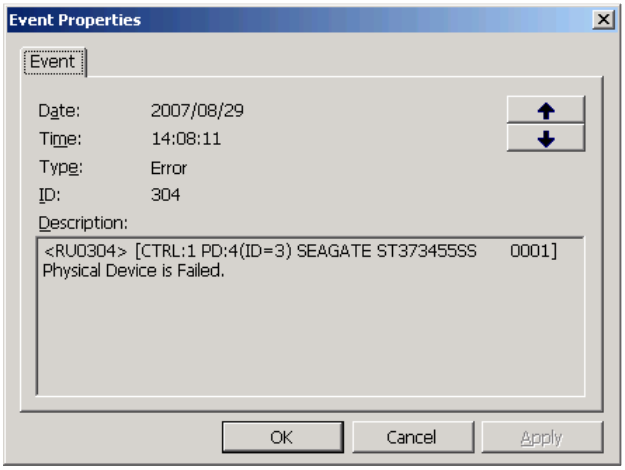
The Status Bar is used only for changing the size of the Log Viewer window.

Log View

The Log View indicates RAID System operation logs logged by the raidsrv service.
You can view the following information on the Log View.

Item	Description
Type	Logs are classified into three types as follows: Fatal: A log of the type is registered when a fatal error occurs. Warning: A log of the type is registered when a problem occurs which is not fatal but requires your attention. Information: A log of the type is registered at occurrence of an event such as execution of an operation without any problem.
Date	Indicates the date on which the event occurred.
Time	Indicates the time at which the event occurred in the 24-hour format.
ID	Indicates the event ID of the log.
Description	Indicates the contents of the log.

Double-clicking an arbitrary log allows the detailed information on the log to be displayed.



Menu Bar

The Log Viewer has two menu items, or [File] and [Help] on the Menu Bar.

Figure 7 Menu of Log Viewer

The following describes each menu item.

[File] menu

[File] menu includes items for updating the display information on the Log Viewer and terminating the Log Viewer.

Menu item	Description
[Refresh]	Reads the contents in the RAID Log and updates the Log View to the latest.
[Properties...]	Opens the [Event Properties] dialog box and displays the detailed information on the log selected by the Log Viewer.
[Exit]	Closes the Log Viewer.

[Help] menu

[Help] menu includes the item of indicating the version of the Log Viewer.

Menu item	Description
[About...]	Indicates the version of the Log Viewer.

Functions of raidcmd

This chapter describes the functions of the raidcmd.

Command Line

To use the raidcmd, specify a command and one or more parameters for the command if necessary.

```
> raidcmd command <parameters of command>
```

Executing the raidcmd without any command and its parameters indicates the version of the raidcmd.

Returned Value from raidcmd

The returned value of the raidcmd is the result of executing the command.

Returned value	Execution result
0	Normal termination of command
1	Abnormal termination of command

Error Messages of raidcmd

When a command of the raidcmd terminates abnormally, the relevant error message appears in the following format:

```
> raidcmd (command) (parameters of command)
raidcmd : error message
>
```

Commands of raidcmd

See " Appendix B : raidcmd Command Reference " for commands of the raidcmd.
Use "**help**" command, displays the help of raidcmd.

Termination of raidcmd

In case of the operating system is Windows, raidcmd is the batch file in system folder (the batch file in system folder call raidcmd binary in the installed folder of Universal RAID Utility). Therefore, if you terminate raidcmd by CTRL + C key, the operating system displays the message as "Terminate batch job (Y/N)?". When displays this message, raidcmd binary is terminated already.

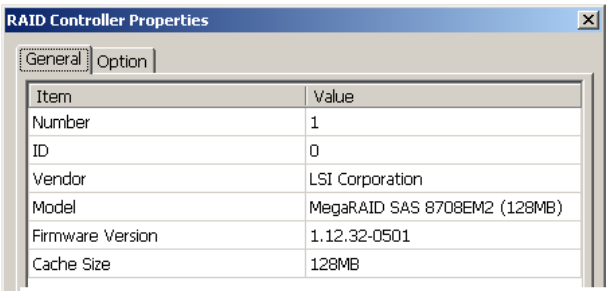
Referring to Information on RAID System

This chapter describes how to see the configurations and status of RAID Systems and the RAID System operation log.

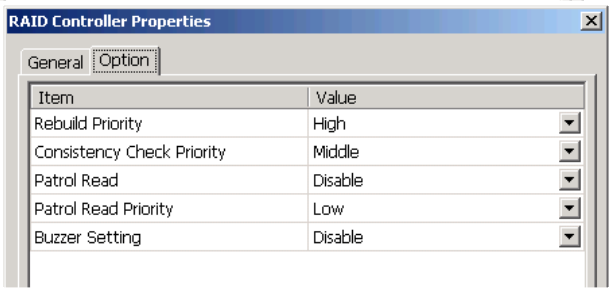
Referring to Property of RAID Controller

For the information on a RAID Controller, see the property of the RAID Controller.

To display the property of RAID Controller by RAID Viewer, click the RAID Controller whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [RAID Controller Properties] dialog box has the [General] and [Option] tabs.
The [General] tab indicates the property of the RAID Controller.



The [Option] tab allows you to see the settings of the RAID Controller.
You can change the settings in the Advanced Mode.



Use "**property**" command to see property of a RAID Controller by raidcmd.

-tg : Specify "rc" to see property of a RAID Controller
-c : Number of the RAID Controller

```
> raidcmd property -tg=rc -c=1
RAID Controller #1
ID                          : 0
Vendor                      : LSI Corporation
Model                       : MegaRAID SAS PCI Express(TM)
ROMB
Firmware Version            : 1.12.02-0342
Cache Size                  : 128MB
Battery Status              : Normal
Rebuild Priority            : High
Consistency Check Priority  : Low
Patrol Read                 : Enable
Patrol Read Priority        : Low
Buzzer Setting              : Enable
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #*X*	Indicates the management number (logical address) of the RAID Controller in the Universal RAID Utility. The Universal RAID Utility assigns a number beginning with 1 for each RAID Controller.
ID	ID	Indicates the original identification value of the RAID Controller. The BIOS utility of the RAID Controller uses the address of the identification value.
Vendor	Vendor	Indicates the vendor of the RAID Controller.
Model	Model	Indicates the model name of the RAID Controller.
Firmware Version	Firmware Version	Indicates the version of the RAID Controller.
Cache Size	Cache Size	Indicates the size of cache on RAID Controller in MB.

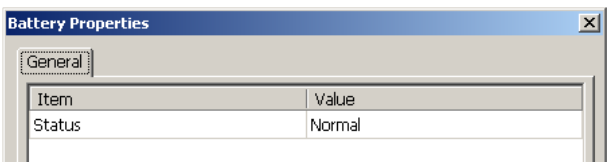
Item RAID Viewer	Item raidcmd	Description
-	Battery Status	Indicates the status of the Battery installed in the RAID Controller. Three possible status are as follows: Normal: Indicates that the Battery can be used normally. Warning: Indicates that the Battery cannot be used normally due to some reason. Not Present: Indicates that no Battery is installed in the RAID Controller. This item is indicated by raidcmd only. You need to see the property of Battery for seeing the information of Battery by RAID Viewer.
Initialize Priority	Initialize Priority	Indicates the priority level of Initialize executed in the computer system. Three possible Initialize Priorities are as follows: High: Executes Initialize at high priority. Middle: Executes Initialize at balanced priority. Low: Executes Initialize at low priority.
Rebuild Priority	Rebuild Priority	Indicates the priority level of Rebuild executed in the computer system. Three possible Rebuild Priorities are as follows: High: Executes Rebuild at high priority. Middle: Executes Rebuild at balanced priority. Low: Executes Rebuild at low priority.
Consistency Check Priority	Consistency Check Priority	Indicates the priority level of Consistency Check executed in the computer system. Three possible Consistency Check Priorities are as follows: High: Executes Consistency Check at high priority. Middle: Executes Consistency Check at balanced priority. Low: Executes Consistency Check at low priority.
Patrol Read	Patrol Read	Indicates whether Patrol Read is executed or not. Enable: Executes Patrol Read. Disable: Does not execute Patrol Read.
Patrol Read Priority	Patrol Read Priority	Indicates the priority level of Patrol Read executed in the computer system. Three possible Patrol Read Priorities are as follows: High: Executes Patrol Read at high priority. Middle: Executes Patrol Read at balanced priority. Low: Executes Patrol Read at low priority.
Buzzer Setting	Buzzer Setting	Indicates whether the Buzzer of the RAID Controller is used if a failure occurs in the RAID System. Enable: Uses the Buzzer. Disable: Does not use the Buzzer.

Some types of the RAID Controller do not support items appearing in the properties of RAID Controllers and/or items whose settings can be changed. Unsupported items indicate space or do not appear in the list.

Referring to Property of Battery

For the information on a Battery on RAID Controller, see the property of the Battery by RAID Viewer and, see the property of the RAID Controller by raidcmd.

To display the property of Battery by RAID Viewer, click the Battery whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File]. The [General] tab indicates the property of the Battery.



Item RAID Viewer	Description
Status	Indicates the status of the Battery installed in the RAID Controller. Three possible status are as follows: Normal: Indicates that the Battery can be used normally. Warning: Indicates that the Battery cannot be used normally due to some reason. Not Present: Indicates that no Battery is installed in the RAID Controller.

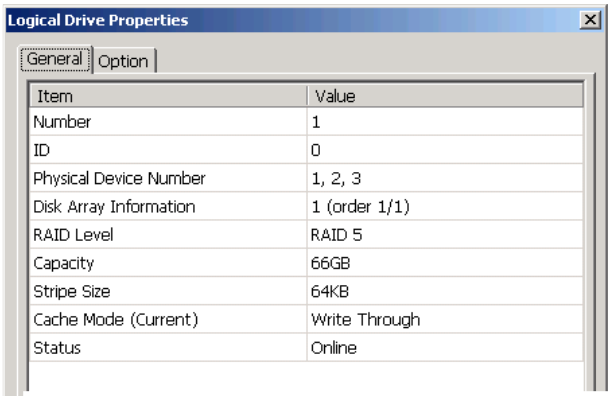
Referring to Property of Logical Drive

For the information on a Logical Drive, see the property of the Logical Drive.

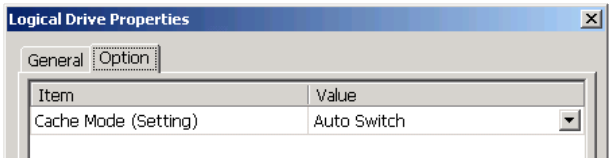
To display the property of Logical Drive by RAID Viewer, click the Logical Drive whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].

The [Logical Drive Properties] dialog box contains the [General] and [Option] tabs.

The [General] tab indicates the property of the Logical Drive.



The [Option] tab allows you to see the settings of the Logical Drive.
You can change the settings in the Advanced Mode.



Use "**property**" command to see property of a Logical Drive by raidcmd.

-tg : Specify "ld" to see property of a Logical Drive
-c : Number of the RAID Controller
-l : Number of the Logical Drive

```
> raidcmd property -tg=ld -c=1 -l=1
RAID Controller #1 Logical Drive #1
ID                          : 0
Physical Device Number      : 1, 2, 3
Disk Array Information      : 1 (order 1/1)
RAID Level                  : RAID 5
Capacity                    : 20GB
Stripe Size                 : 64KB
Cache Mode (Setting)        : Auto Switch
Cache Mode (Current)        : Write Back
Status                      : Online
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #X Logical Drive #Y	Indicates the management number (logical address) of the Logical Drive in the Universal RAID Utility. The Universal RAID Utility assigns a number beginning with 1 in correspondence with the value of [ID].
ID	ID	Indicates the original identification value of the Logical Drive. Use this value to create Logical Drives managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility.
Physical Device Number	Physical Device Number	Indicates the numbers of Physical Devices configuring the Disk Array in which the Logical Drive exists.

Item RAID Viewer	Item raidcmd	Description
Disk Array Information	Disk Array Information	Indicates the number of the Disk Array in which the Logical Drive exists and the information on the location in the Disk Array. The information is displayed in the following format. <RAID Viewer> Disk Array number (sequence number starting from the top / sequence number of Logical Drive in Disk Array) <raidcmd> Disk Array number (order sequence number starting from the top / sequence number of Logical Drive in Disk Array)
RAID Level	RAID Level	Indicates the RAID Level of the Logical Drive. The value can be RAID 0, RAID 1, RAID 5, RAID 6, RAID 00, RAID 10, RAID 1E, RAID 50 or RAID 60.
Capacity	Capacity	Indicates the capacity of the Logical Drive in GB.
Stripe Size	Stripe Size	Indicates the Stripe Size of the Logical Drive. The value can be 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, or 1024KB.
Cache Mode (Setting)	Cache Mode (Setting)	Indicates the mode of writing data to the cache memory installed in the RAID Controller. Three possible modes are as follows: Auto Switch: Switches the mode automatically between Write Back and Write Through depending on the existence and/or status of Battery. Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Cache Mode (Current)	Cache Mode (Current)	Indicates the current value of the mode of writing data to the cache memory installed in the RAID Controller. Three possible modes are as follows: Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Status	Status	Indicates the status of the Logical Drive. Three possible status are as follows: Online: Indicates that the redundancy of the Logical Drive is retained. Degraded: Indicates that the redundancy of the Logical Drive is lost or degraded. Accessing to the Logical Drive is enabled. Offline: Indicates that the Logical Drive is offline and accessing to the Logical Drive is disabled.

- Each RAID Controller supports specific RAID Levels and Stripe Sizes. Unsupported items indicate space or do not appear in the list.
- Each RAID Controller supports specific Cache Modes. Unsupported Cache Modes do not appear.
- Each RAID Controller supports specific items appearing on the Property tab of the Logical Drive and specific items whose settings can be changed. Unsupported items indicate space or do not appear in the list.

The status of a Logical Drive is defined depending on the RAID Level and the number of Physical Devices failed.

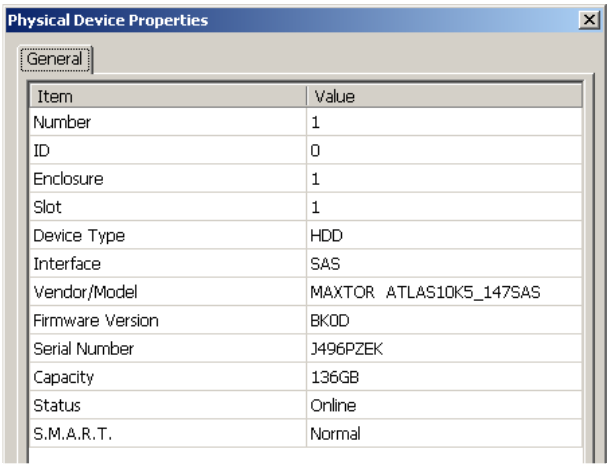
If the RAID Level is RAID 10 or RAID 50 and two Physical Devices are failed, the status will be [Degraded] or [Offline] depending on the failed Physical Devices.

Number of failed Physical Devices	0	1	2	3 or more
RAID 0	Online	Offline	Offline	Offline
RAID 1	Online	Degraded	Offline	-
RAID 5	Online	Degraded	Offline	Offline
RAID 6	Online	Degraded	Degraded	Offline
RAID 10	Online	Degraded	Degraded/Offline	Offline
RAID 50	Online	Degraded	Degraded/Offline	Offline

Referring to Property of Physical Device

For the information on a Physical Device, see the property of the Physical Device.

To display the property of Physical Device by RAID Viewer, click the Physical Device whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [General] tab indicates the property of the Physical Device.



Use "**property**" command to see property of a Physical Device by raidcmd.

-tg : Specify "pd" to see property of a Physical Device
-c : Number of the RAID Controller
-p : Number of the Physical Device

```
> raidcmd property -tg=pd -c=1 -p=1
RAID Controller #1 Physical Device #1
ID                      : 0
Enclosure               : 1
Slot                    : 1
Device Type             : HDD
Interface               : SAS
Vendor/Model            : SEAGATE  ST936751SS
Firmware Version        : 0001
Serial Number           : 3PE073VM
Capacity                : 33GB
Status                  : Online
S.M.A.R.T.              : Normal
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller #*X* Physical Device #*Y*	Indicates the management number (logical address) of the Physical Device in the Universal RAID Utility. The Universal RAID Utility arranges Physical Devices in the ascending order of IDs and assigns a number beginning with 1 sequentially to the Physical Devices.
ID	ID	Indicates the original identification value of the Physical Device. Use this value to make Physical Devices managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility. The format of the ID varies depending on the types of RAID Controllers.
Enclosure	Enclosure	Indicates the number of Enclosure inserted Physical Device. This value is a number beginning with 1.

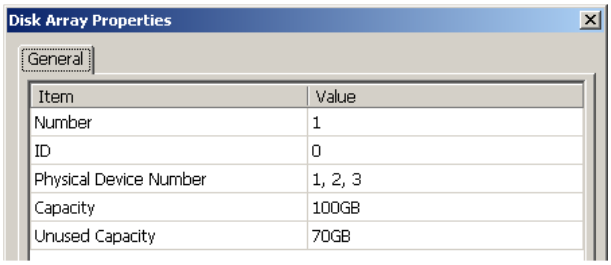
Item RAID Viewer	Item raidcmd	Description
Slot	Slot	Indicates the number of Slot inserted Physical Device. This value is a number beginning with 1.
Device Type	Device Type	Indicates the type of Physical Device. Four possible types are as follows: HDD : Hard Disk Drive HDD(SSD) : Solid State Drive Tape Drive : Tape Drive CD/DVD : CD drive or DVD drive
Interface	Interface	Indicates the type of the interface to which the Physical Device is connected. Two possible types are as follows: SAS : Serial Attached SCSI SATA : Serial ATA
Vendor/Model	Vendor/Model	Indicates the vendor and model name of the Physical Device.
Firmware Version	Firmware Version	Indicates the version of the Physical Device.
Serial Number	Serial Number	Indicates the serial number of the Physical Device. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Capacity	Capacity	Indicates the capacity of the Physical Device in GB. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Status	Status	Indicates the status of the Physical Device. Five possible status are as follows: Online: Indicates that the Physical Device is incorporated into a Logical Drive to operate normally. Failed: Indicates that the Physical Device is incorporated. Rebuilding: Indicates that the Physical Device is rebuilding. Hot Spare: Indicates that the Physical Device is set as a Hot Spare. Ready: Indicates that the Physical Device is not incorporated into a Logical Drive. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].
Hot Spare Information	Hot Spare Information	Indicates the Hot Spare mode of the Physical Device if it is specified as a Hot Spare. Two possible modes are as follows: Global: The Physical Device can be used as a Hot Spare of any Disk Array in the RAID Controller. Dedicated: The Physical Device can be used as a Hot Spare of the specified Disk Array. Also indicates the number of the specified Disk Array. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)] and the Physical Device is Hot Spare.
S.M.A.R.T.	S.M.A.R.T.	Indicates the diagnosis result of S.M.A.R.T.(Self-Monitoring, Analysis and Reporting Technology) function. Two possible statuses are as follows. Normal: Does not detect any error caused by the S.M.A.R.T. function. Detected: Detects one or more errors caused by the S.M.A.R.T. function. This item is indicated when [Device Type] item is [HDD] or [HDD(SSD)].

- Each RAID Controller supports specific items appearing on the Property tab of the Physical Device and specific items whose settings can be changed. Unsupported items indicate space or do not appear in the list.
- Even if Physical Device does not break down when you execute Make Offline, [Status] item is changed to [Failed].

Referring to Property of Disk Array

For the information on a Disk Array, see the property of the Disk Array.

To display the property of Disk Array by RAID Viewer, click the Disk Array whose information is to be seen on the Tree View and click [Properties] on the pull-down menu of menu item [File].
The [General] tab indicates the property of the Disk Array.



Use "**property**" command to see property of a Disk Array by raidcmd.

-tg : Specify "da" to see property of a Disk Array
-c : Number of the RAID Controller
-a : Number of the Disk Array

```
> raidcmd property -tg=da -c=1 -a=1
RAID Controller #1 Disk Array #1
ID                          : 0
Physical Device Number      : 1, 2, 3
Capacity                    : 67GB
Unused Capacity             : 47GB
>
```

Item RAID Viewer	Item raidcmd	Description
Number	RAID Controller *#X* Disk Array *#Y*	Indicates the management number (logical address) of the Disk Array in the Universal RAID Utility.
ID	ID	Indicates the original identification value of the Disk Array. Use this value to create Disk Array managed by the BIOS utility of the RAID Controller correspond with those managed by the Universal RAID Utility.
Physical Device Number	Physical Device Number	Indicates the numbers of Physical Devices configuring the Disk Array.
Capacity	Capacity	Indicates the total capacity of Physical Device in Disk Array in GB.
Unused Capacity	Unused Capacity	Indicates the total capacity of unused area in the Disk Array in GB.

Checking Execution Status of Operation

RAID Viewer and raidcmd allows the checking execution status of operation in the RAID System.

To check the execution status of operation by RAID Viewer, use Operation View on RAID Viewer. See "Operation View" for detail.

To check the execution status of operation by raidcmd, use "**oplist**" command.
The following operations are displayed by "**oplist**" command.
The target components and status appear in operations:

- Initialize
- Rebuild
- Consistency Check

```
> raidcmd oplist
RAID Controller #1
LD #1 : Consistency Check (Running 52%)
LD #2 : Initialize (Running 33%)
PD #1 : Rebuild (Running 99%)

RAID Controller #2
LD #1 : Consistency Check (Running 2%)
PD #2 : Rebuild (Paused 22%)
>
```

The operation performed at execution of the raidcmd appears. Terminated operations do not appear. For the results of terminated operations, see the RAID Log and/or properties.

Status	Description
Running (*N* %)	The operation is running (*N* is progress).
Paused (*N* %)	The operation is paused (*N* is progress).
Queued (*N* %)	The operation is queued (*N* is progress).

Updating Information of RAID System

The management information of RAID System managed by the Universal RAID Utility is corrected by the raidsrv service at the following timings:

- Starting raidsrv service
- Receiving an event such as change of RAID System status or change of execution status of an operation having occurred

To update the management information of the RAID System to the latest, collect the newest information of all RAID System by the RAID Viewer and raidcmd.

RAID Viewer

Use [Rescan] in [File] menu.

Step 1 Start the RAID Viewer. Click [Rescan] in [File] menu. The raidsrv service acquires the information on the RAID System from the RAID System again and updates the management information to the latest.

raidcmd

Use "**rescan**" command.

Step 1 Execute "**rescan**" command. The raidsrv service acquires the information of the RAID System again and updates the management information to the latest.

Referring to RAID System Operation Log

Operations done for RAID Systems and events occurred in the RAID Systems are registered to the RAID Log of the Universal RAID Utility. See "Logging Events to RAID Log" for detail.

In case of the operating system is Windows, use Log Viewer to see RAID Log

The information saved in the RAID Log at the start of the Log Viewer appears on it. To update the information, click [Refresh] on the pull-down menu of menu item [File]. The Log Viewer acquires the RAID Log again and updates the displayed information to the latest.

In case of the operating system is Linux, use text editor or otherwise to see “Logging Events to RAID Log.”

Configuration of RAID System

This chapter describes the configuration of a RAID System by using the Universal RAID Utility.

The Universal RAID Utility provides a variety of functions depending on purposes.

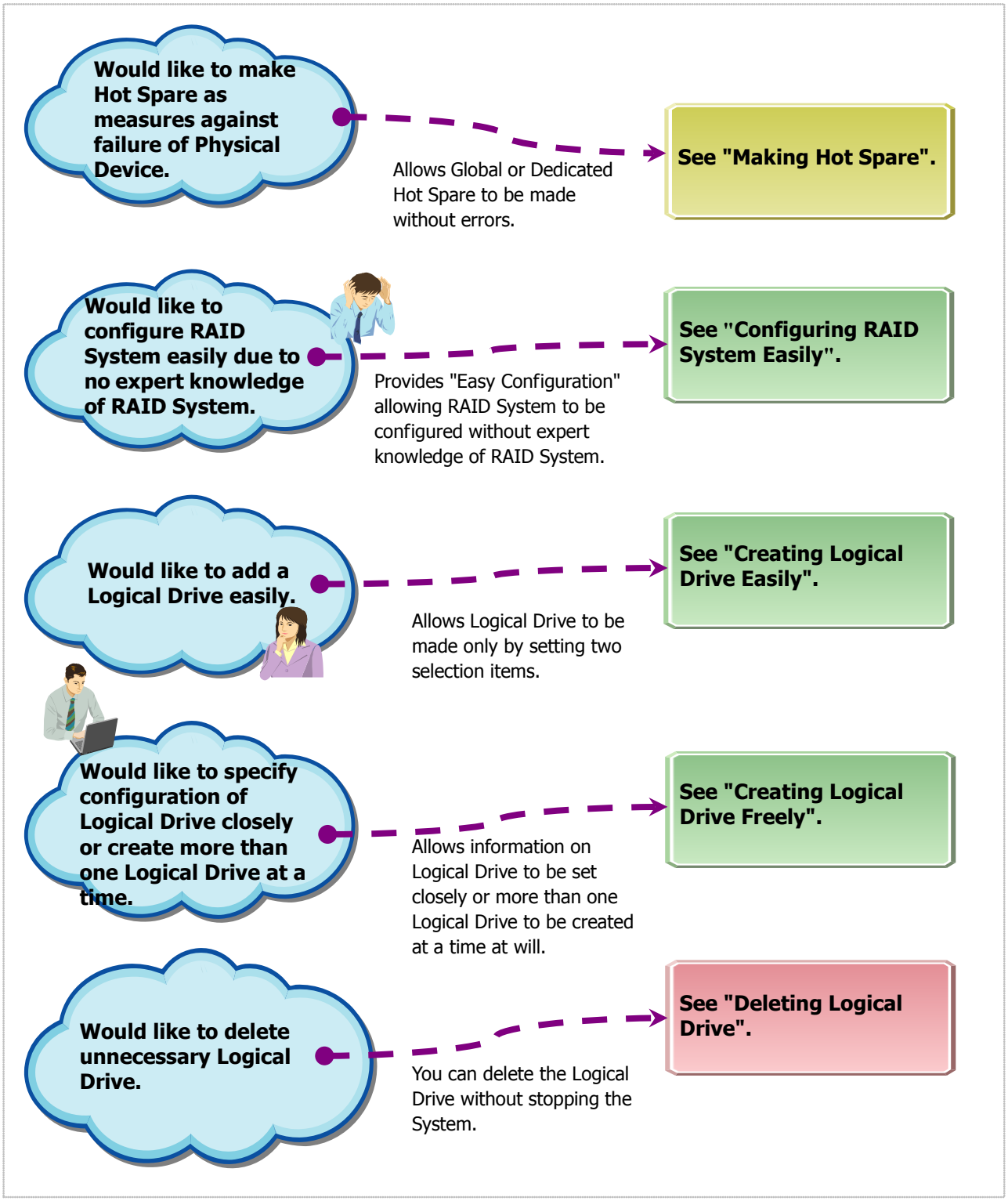

Would like to make Hot Spare as measures against failure of Physical Device.
Allows Global or Dedicated Hot Spare to be made without errors.
See "Making Hot Spare".
Would like to configure RAID System easily due to no expert knowledge of RAID System.
Provides "Easy Configuration" allowing RAID System to be configured without expert knowledge of RAID System.
See "Configuring RAID System Easily".
Would like to add a Logical Drive easily.
Allows Logical Drive to be made only by setting two selection items.
See "Creating Logical Drive Easily".
Would like to specify configuration of Logical Drive closely or create more than one Logical Drive at a time.
Allows information on Logical Drive to be set closely or more than one Logical Drive to be created at a time at will.
See "Creating Logical Drive Freely".
Would like to delete unnecessary Logical Drive.
You can delete the Logical Drive without stopping the System.
See "Deleting Logical Drive".

Figure 8 RAID System configuration functions

Making Hot Spare

The Universal RAID Utility can make a Hot Spare to be replaced with a Physical Device in which a failure occurs. Hot spares can have the following two modes.

Mode	Description
Global (Hot Spare)	Available as a Hot Spare of every Disk Array for a single RAID Controller.
Dedicated (Hot Spare)	Available as a Hot Spare of a specific Disk Array for a single RAID Controller.

In either mode, note the following to have a Hot Spare operate normally.

- A Hot Spare can operate properly only for a Disk Array configured with Physical Devices of the same interface type and the same device type.
- A Hot Spare can operate properly only if the Hot Spare has the capacity equal to or larger than that of the Physical Device in which a failure occurs.
- A Physical Device in which a S.M.A.R.T. error is detected cannot be used as a Hot Spare.

IMPORTANT **The maximum number of Hot Spares that can be created is 8 for N8103-109/128/134/135 RAID Controllers.**

About Global Hot Spare

Global Hot Spare is a Hot Spare for all the Disk Arrays under a single RAID Controller.

Ex.1 : If you make the Global Hot Spare on the RAID Controller which has Disk Arrays #1 and #2, the Global Hot Spare is a Hot Spare of Disk Arrays #1 and #2.

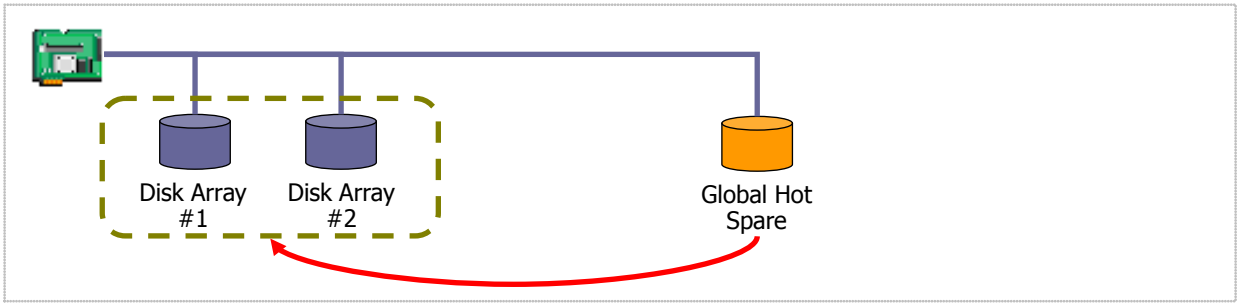


Figure 9 Global Hot Spare 1

Ex.2 : If you create the Disk Array #3 on the RAID System of Ex.1, the Global Hot Spare is a Hot Spare for the Disk Array #3 too.

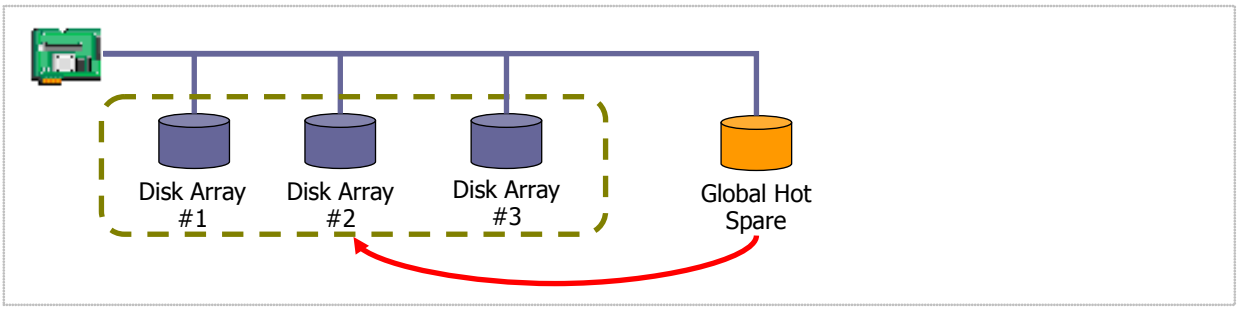


Figure 10 Global Hot Spare 2

About Dedicated Hot Spare

Dedicated Hot Spare is a Hot Spare for the specified Disk Arrays under a single RAID Controller. The Dedicated Hot Spare has the following features:

- Dedicated Hot Spare is a Hot Spare for specified Disk Arrays.
- One Dedicated Hot Spare can be a Hot Spare for one or more Disk Arrays.
- One or more Dedicated Hot Spare can be a Hot Spare for one or more Disk Arrays.

CHECK

- Dedicated Hot Spares cannot be created in a Disk Array containing Logical Drives with the RAID Level being RAID 0.
- Dedicated Hot Spares cannot be created in a Disk Array which does not have any Logical Drive.
- Dedicated Hot Spare can be created by a Physical Device as which a Physical Device of the same Interface Type and Device Type to create the Disk Array.

Ex 1 : You make the Dedicated Hot Spare on the RAID Controller which has Disk Arrays #1 and #2. If you specify only the Disk Array #1 as the target Disk Array, the Dedicated Hot Spare is a Hot Spare of Disk Array #1.

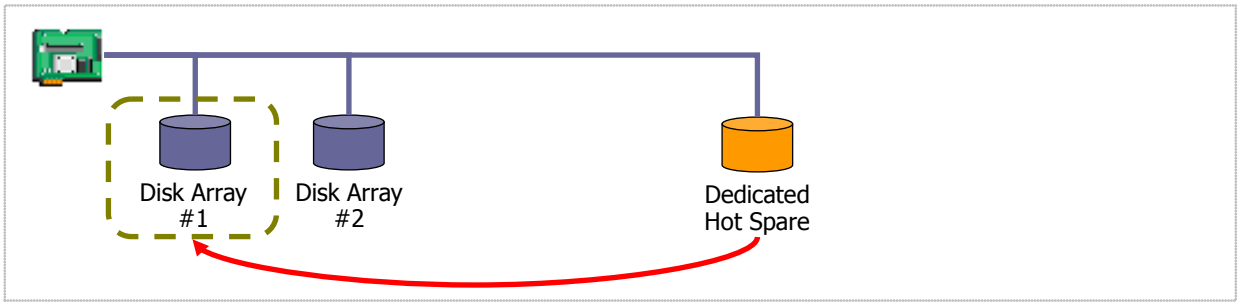


Figure 11 Dedicated Hot Spare 1

Ex 2 : If you specify the Disk Arrays #1 and #2 as the target Disk Array, the Dedicated Hot Spare is a Hot Spare of Disk Arrays #1 and #2.

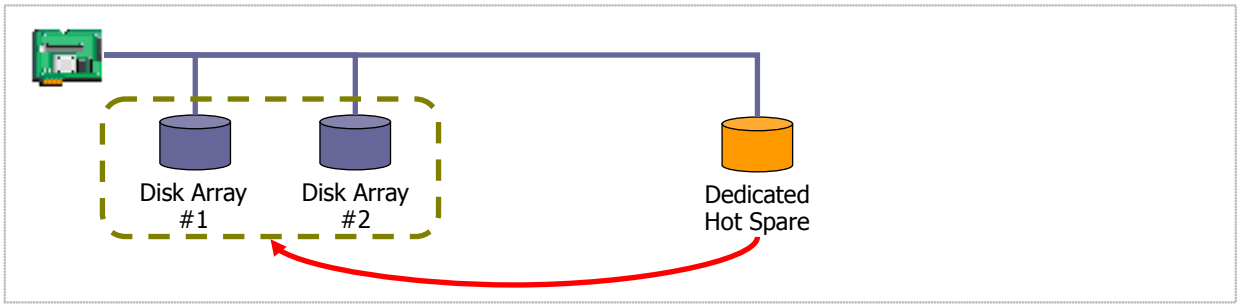


Figure 12 Dedicated Hot Spare 2

Ex 3 : In case of the RAID System in Ex1, you can add more Dedicated Hot Spare . If you add the Dedicated Hot Spare #2 to the Disk Array #1, the both Dedicated Hot Spare are the Hot Spare for the Disk Array #1.

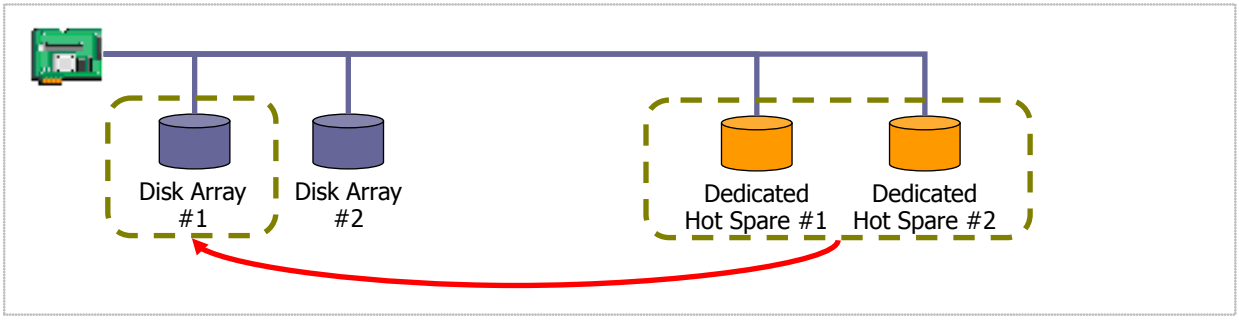


Figure 13 Dedicated Hot Spare 3

Ex 4 : In case of the RAID System in Ex2, you can add more Dedicated Hot Spare likely Ex2. If you add the Dedicated Hot Spare to the Disk Arrays #1 and #2, the both Dedicated Hot Spare are the Hot Spare for the Disk Arrays #1 and #2.

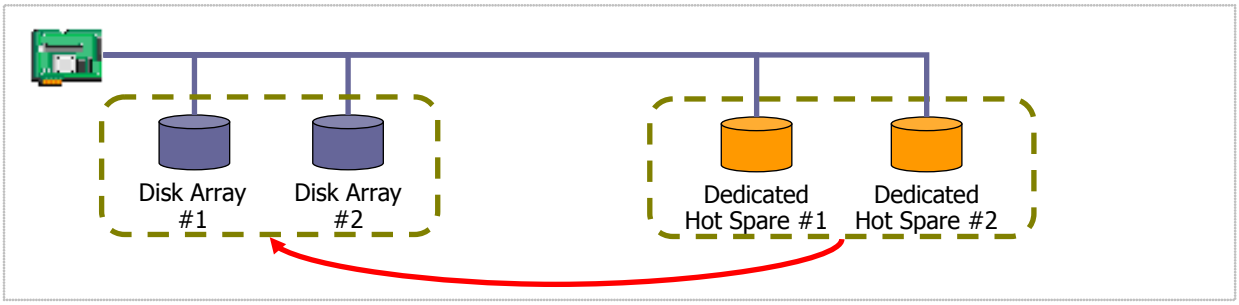


Figure 14 Dedicated Hot Spare 4

Making Global Hot Spare

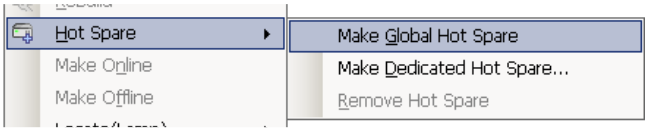
The procedure of making a Global Hot Spare is described below.

RAID Viewer

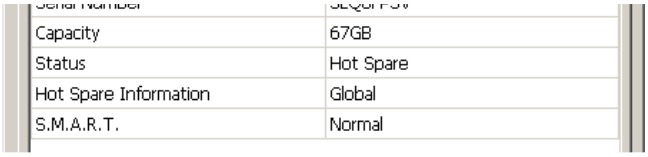
Use [Make Global Hot Spare] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Ready] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Make Global Hot Spare].



Step 3 If you see the property of the Physical Device after making a Global Hot Spare, you can find that the value of [Status] is set to [Hot Spare] and item [Hot Spare Information] appears newly with value [Global].



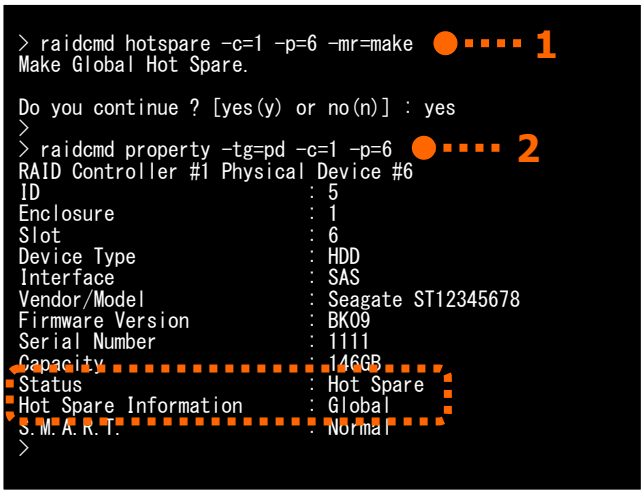
raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with –mr option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device with which a Hot Spare is made
-p : Number of the Physical Device with which a Global Hot Spare is made
-mr : Specify "make" to make Global Hot Spare

Step 2 If you see the property of the Physical Device after making the Global Hot Spare, you find that the value of [Status] is changed to [Hot Spare] and new item [Hot Spare Information] appears with value [Global].



Making Dedicated Hot Spare

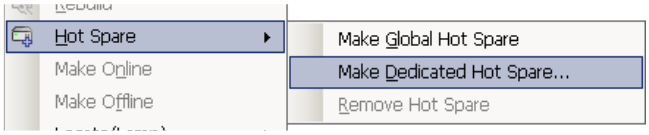
The procedure of making a Dedicated Hot Spare is described below.

RAID Viewer

Use [Make Dedicated Hot Spare...] in [Control] menu.

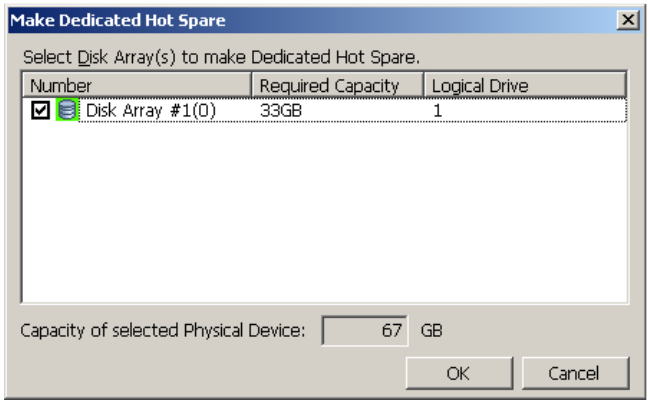
Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Ready] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Make Dedicated Hot Spare...].

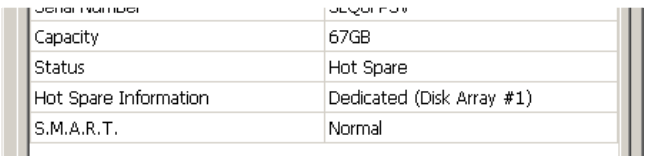


Step 3 The [Make Dedicated Hot Spare] dialog box appears. Check the check box of the Disk Array for which a Dedicated Hot Spare is to be made. The Dedicated Hot Spare may be made for more than one Disk Array. However, it cannot be made for a Disk Array requiring a capacity larger than [Capacity of selected Physical Device].

Click [OK] to make the Dedicated Hot Spare.



Step 4 If you see the property of the Physical Device after making a Dedicated Hot Spare, you can find that the value of [Status] is set to [Hot Spare] and item [Hot Spare Information] appears newly with value [Dedicated (Disk Array #*X*)].



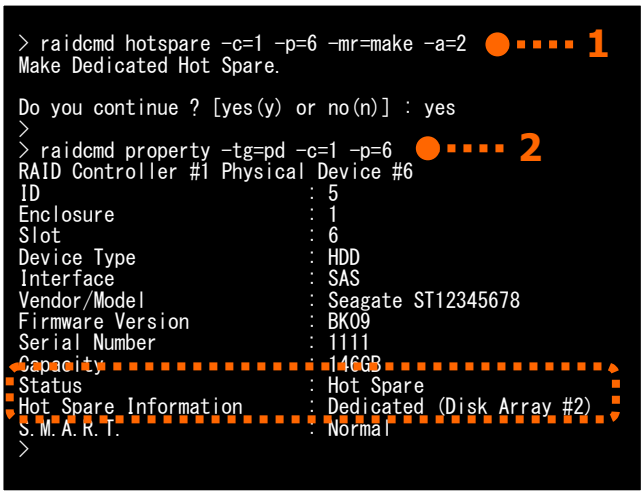
raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with -mr option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device with which a Hot Spare is made
-p : Number of the Physical Device with which a Dedicated Hot Spare is made(The capacity of the Physical Device should be equal to or larger than any Physical Device used by the target Disk Array)
-mr : Specify "make" to make Dedicated Hot Spare
-a : Number of the target Disk Array using the Dedicated Hot Spare

Step 2 If you see the property of the Physical Device after making the Dedicated Hot Spare, you find that the value of [Status] is changed to [Hot Spare] and new item [Hot Spare Information] appears with value [Dedicated].



Removing Hot Spare

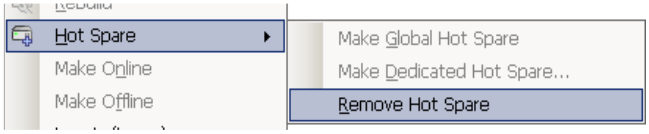
The procedure of removing a Hot Spare is described below.

RAID Viewer

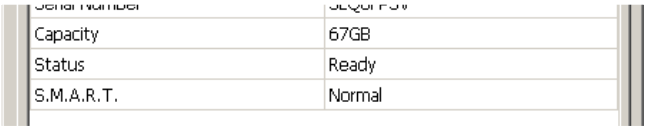
Use [Remove Hot Spare] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Hot Spare] on the Tree View.

Step 2 Select [Hot Spare] on the pull-down menu of menu item [Control] and click [Remove Hot Spare].



Step 3 If you see the property of the Physical Device after removing it from the Hot Spare, you can find that the value of [Status] is set to [Ready] and item [Hot Spare Information] disappears.



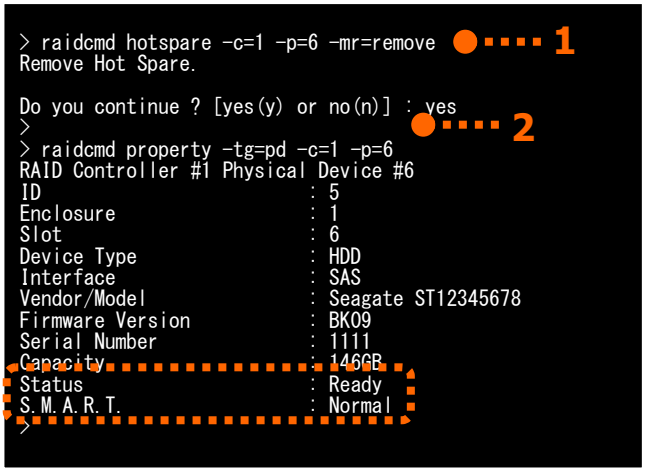
raidcmd

Use "**hotspare**" command.

Step 1 Execute "**hotspare**" command with -mr option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device from which the Hot Spare is removed
-p : Number of the Physical Device from which the Hot Spare is removed
-mr : Specify "remove" to remove Hot Spare

Step 2 If you see the property of the Physical Device after removing the Hot Spare, the value of [Status] is changed to [Ready] and item [Hot Spare Information] disappears.



Configuring RAID System Easily

The Universal RAID Utility supports the Easy Configuration function allowing configurations such as creating Logical Drive and making a Hot Spare to be provided in the state where unused Physical Devices are connected to RAID Controllers.

If you decide the number of Physical Devices used for data storage (or the number of Physical Devices configuring Logical Drives) and the number of Physical Devices used as Hot Spares among unused Physical Devices connected to RAID Controllers, the Universal RAID Utility automatically configure the RAID System.
The benefits of configuring a RAID System by using the Easy Configuration are as follows. The Universal RAID Utility performs the jobs which must be examined and manipulated to configure a RAID System instead.

- Allowing a RAID System to be configured only by specifying three items, or a RAID Controller, the number of Physical Devices used for Logical Drives and the number of Logical Drives to be created.
- Allowing the Universal RAID Utility to set all the items associated with Logical Drives (including RAID Level, Capacity, and Stripe Size) automatically.
- Allowing more than one Logical Drive to be created at a time.
- Making Dedicated Hot Spares for Logical Drives automatically created by Universal RAID Utility if Physical Devices are left for Hot Spares.

IMPORTANT **The maximum number of Hot Spares that can be created is 8 for N8103-109/128/134/135 RAID Controllers.**
Easy Configuration will fail if you specify more than 8 Hot Spares.

Procedure of Easy Configuration of RAID System

The following describes the procedure of configuring a RAID System easily.

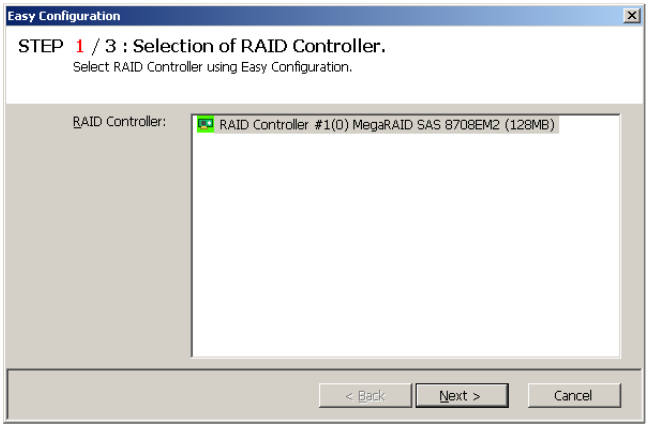
RAID Viewer

Use [Easy Configuration...] in [Tool] menu.

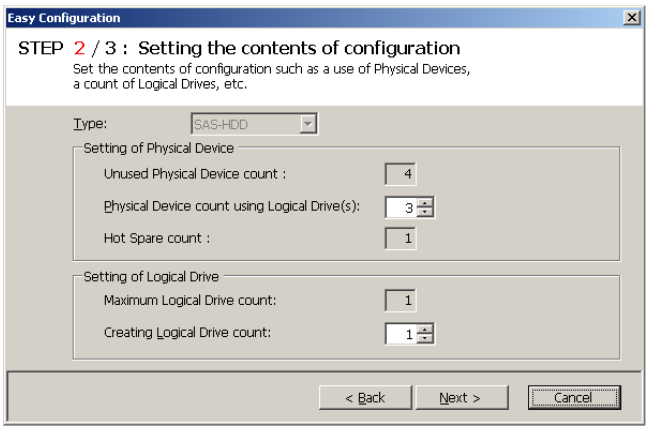
Step 1 Connect Physical Devices used for Easy Configuration to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

Step 2 Click [Easy Configuration...] on the pull-down menu of menu item [Tool].

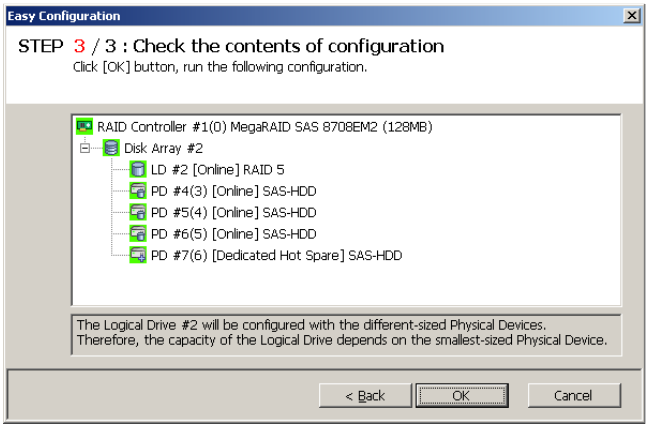
Step 3 The [Easy Configuration...] wizard is started. In step 1/3, select the RAID Controller to be configured by clicking it. Then click [Next].
In the [RAID Controller] area, RAID Controllers which do not meet the conditions on Easy Configuration do not appear.


Easy Configuration
STEP 1 / 3 : Selection of RAID Controller.
Select RAID Controller using Easy Configuration.
RAID Controller:
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
< Back
Next >
Cancel

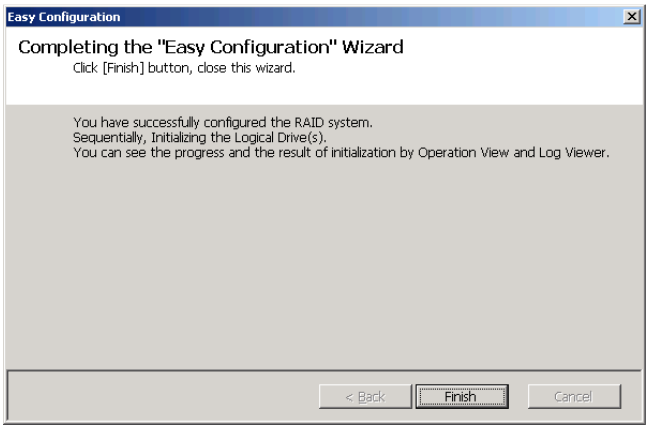
Step 4 In step 2/3, specify the number of Physical Devices used by Logical Drives (or the number of Physical Devices used for data storage) and the number of Logical Drives created in the RAID Controller. If Physical Devices of different interface types or device type exist, specify the number of Physical Devices in each type. After the specification, click [Next].



Step 5 Step 3/3 shows the configuration of the RAID System to be configured by the Easy Configuration. To the RAID System according to the displayed information, click [OK]. To change the configuration, click [Back].


Easy Configuration
STEP 3 / 3 : Check the contents of configuration
Click [OK] button, run the following configuration.
RAID Controller #1(0) MegaRAID SAS 8708EM2 (128MB)
Disk Array #2
LD #2 [Online] RAID 5
PD #4(3) [Online] SAS-HDD
PD #5(4) [Online] SAS-HDD
PD #6(5) [Online] SAS-HDD
PD #7(6) [Dedicated Hot Spare] SAS-HDD
The Logical Drive #2 will be configured with the different-sized Physical Devices.
Therefore, the capacity of the Logical Drive depends on the smallest-sized Physical Device.
< Back
OK
Cancel

Step 6 If you click [OK] in step 3/3, then the RAID System will be configured. After the Logical Drives are created and the makings of Hot Spares are completed, [Completing the "Easy Configuration" Wizard] appears. Now creating the Logical Drives and making Hot Spares is completed. After the wizard is closed, see the Tree View to check the configuration. However, the Initialize of the Logical Drives having been created may not be completed. The progress and result of initializing the Logical Drives can be checked on the Operation View.


Easy Configuration
Completing the "Easy Configuration" Wizard
Click [Finish] button, close this wizard.
You have successfully configured the RAID system.
Sequentially, Initializing the Logical Drive(s).
You can see the progress and the result of initialization by Operation View and Log Viewer.
< Back
Finish
Cancel

raidcmd

Use "**econfig**" command.

Step 1 Connect Physical Devices used for Easy Configuration to the RAID Controller at this timing if required.

Step 2 Execute "**econfig**" command.

Step 3 Specify the conditions on Easy Configuration.
In step 1/3, select the RAID Controller to be configured. Enter the RAID Controller number to be configured.

Step 4 In step 2/3, specify the number of Physical Devices used for Logical Drive(s) ("Physical Device count using Logical Drive(s)") and the number of Logical Drives to be created in the RAID Controller ("Making Logical Drive count"). If Physical Devices of different Interface Types or Device Type exist, specify the number of Physical Devices in each type (in the example shown to the right, proper settings are provided for Physical Devices of the SAS interface. If other Physical Devices of different types exist, perform the operation in each type).

Step 5 Step 3/3 shows the configuration of the RAID System to be configured by the Easy Configuration. To configure the RAID System according to the displayed information, type "yes". To change the configuration, type "no".
If you type "yes", the raidcmd executes the configuration of the RAID System and terminates normally. Making Logical Drives and Hot Spares is now completed. See the property of each component to check the configuration. However, the Initialize of the Logical Drives having been created may not be completed. The progress of initializing the Logical Drives can be checked by using "**oplist**" command. The result of initializing the Logical Drive can be checked by RAID Log.

```
> raidcmd econfig ●···· 2
Step 1/3 : Select RAID Controller

RAID Controller #1 MegaRAID SAS PCI Express(TM) ROMB
RAID Controller #2 MegaRAID SAS 8480E

RAID Controller [1-2] : 1 ●···· 3

Step 2/3 : Set the contents of configuration

<Physical Device (Type : SAS-HDD)>
Unused Physical Device count                          : 7
Physical Device count using Logical Drive(s) [ 2- 7] : 6
Hot Spare count                                       : 1

Do you continue ? [yes(y) or no(n)] : y

Maximum Logical Drive count                           : 2
Creating Logical Drive count [ 1- 2]                  : 1

Do you continue ? [yes(y) or no(n)] : y ●···· 4

Step 3/3 : Confirm the contents of configuration

RAID Controller #1(0) MegaRAID SAS PCI Express(TM) ROMB
  Disk Array #1
    LD #1 [Online] RAID 5
    PD #1(0) [Online] SAS-HDD
    PD #2(1) [Online] SAS-HDD
    PD #3(2) [Online] SAS-HDD
    PD #7(6) [Dedicated Hot Spare] SAS-HDD
  Disk Array #2
    LD #2 [Online] RAID 5
    PD #4(3) [Online] SAS-HDD
    PD #5(4) [Online] SAS-HDD
    PD #6(5) [Online] SAS-HDD
    PD #7(6) [Dedicated Hot Spare] SAS-HDD
  Disk Array #3
    LD #3 [Online] RAID 1
    PD #8(7) [Online] SATA-HDD
    PD #9(8) [Online] SATA-HDD
    PD #10(9) [Dedicated Hot Spare] SATA-HDD

<Caution>
Create Logical Drive #2 with different Physical Devices of
a capacity. Therefore, Logical Drive capacity is decided by
the smallest Physical Device of capacity.

Run the above configuration.
Initialize all of Logical Drive after creating them. You can
see the progress and the result of Initialize by "oplist"
and "property" commands.

Do you continue ? [yes(y) or no(n)] : yes ●···· 5
>
```

RAID Controller and Physical Device have two numbers in Step 3/3.
RAID Controller #A (B)
Physical Device #C (D)
A : The number of RAID Controller, B : ID of RAID Controller
C : The number of Physical Device, D : ID of Physical Device

RAID Controller Enabling Easy Configuration to Be Executed

Any RAID Controller enabling Easy Configuration to be executed must meet the following conditions.

1. Allowing Dedicated Hot Spares to be made, and
2. Connecting with more than one unused Physical Device.

Physical Devices Available for Easy Configuration

Only unused Physical Devices are available for Easy Configuration. Unused Physical Devices are those with their [Status] being [Ready].

Creating Logical Drives by Easy Configuration

Logical Drives created by Easy Configuration are described below.

RAID Levels and the number of Logical Drives allowed to be created

The RAID Level of a Logical Drive created by Easy Configuration should be RAID 1 or RAID 5. Whether RAID 1 or RAID 5 is used is defined by RAID Levels supported by the RAID Controller and the number of Physical Devices used by the Logical Drive.
The number of Logical Drives allowed to be created is also defined by the similar conditions.

RAID Controller supporting RAID Levels RAID 1 and RAID 5

Number of Physical Devices used by Logical Drive	RAID Level of Logical Drive	Number of Logical Drives allowed to be created
2	RAID 1	1
3 - 5	RAID 5	1
6 or more	RAID 5	Number of Physical Devices used by Logical Drive / 3

RAID Controller supporting RAID 1 only

Number of Physical Devices used by Logical Drive	RAID Level of Logical Drive	Number of Logical Drives allowed to be created
2 or more	RAID 1	Number of Physical Devices used by Logical Drive / 2

IMPORTANT

The Easy Configuration can only create Logical Drives of RAID 1 or RAID 5.

Physical Devices used for Logical Drives

Physical Devices of lower Physical Device Numbers are used preferentially for Logical Drives to be created excluding those for making Hot Spares.

Ex. : If Physical Devices #1 - #7 can be used for Easy Configuration and Physical Device #3 is used as a Hot Spare, Logical Drives #1 and #2 are created with Physical Devices #1 and #2 having lower Physical Device Numbers and Physical Devices #5, #6 and #7, respectively.

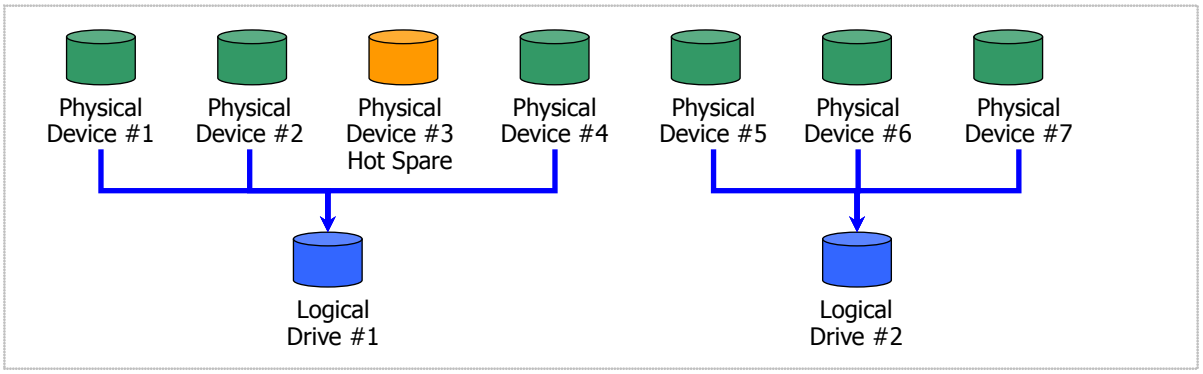


Figure 15 Assigning Physical Devices in Easy Configuration 1

If more than one Logical Drive are created and the number of Physical Devices configuring a Logical Drive is not equal to others, a larger number of Physical Devices should be assigned to a Logical Drive having a smaller logical number.

Ex.: If Physical Devices #1 - #7 can be used for Easy Configuration and two Logical Drives are created, Logical Drives #1 and #2 are created with four Physical Devices #1 - #4 and three Physical Devices #5 - #7, respectively.

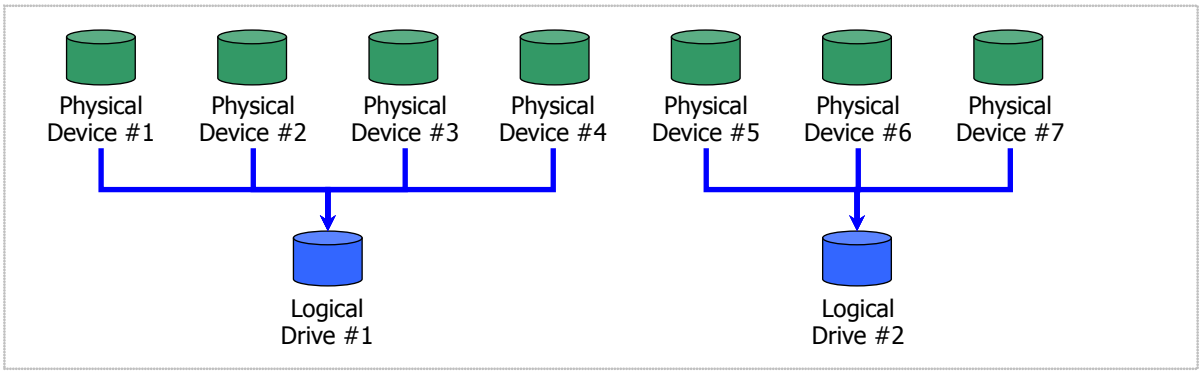


Figure 16 Assigning Physical Devices in Easy Configuration 2

CHECK Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.

Capacity of Logical Drive

The capacity of a Logical Drive to be created is defined by the RAID Level and the capacities of Physical Devices used for the Logical Drive.
The Easy Configuration uses the entire areas of the Physical Devices to create a Logical Drive.

When a single Logical Drive is created by using Physical Devices of different capacities, the smallest capacity is applied among those of the Physical Devices.

Ex.: If Physical Devices #1 - #7 of different capacities can be used in Easy Configuration to create two Logical Drives, use Physical Devices #1 - #4 and #5 - #7 to create Logical Drives #1 and #2, respectively. The capacity of each Logical Drive is defined by the smallest capacity among those of the Physical Devices for the Logical Drive.

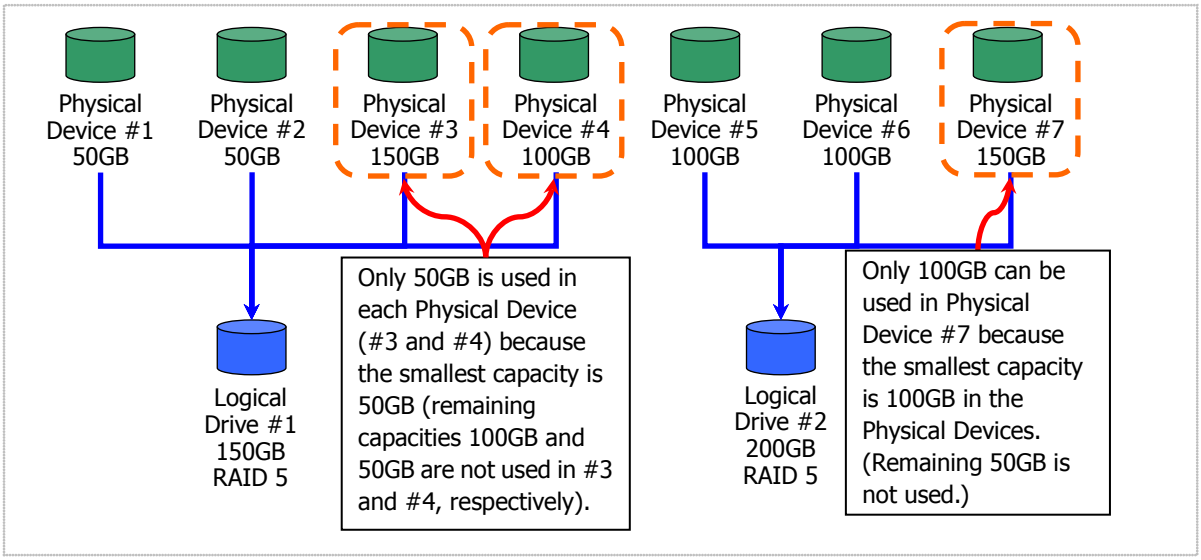

Physical Device #1 50GB
Physical Device #2 50GB
Physical Device #3 150GB
Physical Device #4 100GB
Physical Device #5 100GB
Physical Device #6 100GB
Physical Device #7 150GB
Logical Drive #1 150GB RAID 5
Only 50GB is used in each Physical Device (#3 and #4) because the smallest capacity is 50GB (remaining capacities 100GB and 50GB are not used in #3 and #4, respectively).
Logical Drive #2 200GB RAID 5
Only 100GB can be used in Physical Device #7 because the smallest capacity is 100GB in the Physical Devices. (Remaining 50GB is not used.)

Figure 17 Capacities of Logical Drives in Easy Configuration

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection item	Value
Stripe Size	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Cache Mode	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Initialize Mode	Full

Making Hot Spares by Easy Configuration

This section describes the information on Hot Spares to be made by the Easy Configuration.

Number of Hot Spares

The number of Hot Spares is defined by the number of unused Physical Devices connected to the RAID Controller and the number of Physical Devices used for Logical Drives. The number of Hot Spares results from subtracting [Number of Physical Devices specified for Logical Drives] from [Unused Physical Device count] in step 2/3 of the [Easy Configuration...] wizard of RAID Viewer or "**econfig**" command of raidcmd.

Physical Devices used as Hot Spares

Physical Devices of larger capacities are preferentially used as Hot Spares. Among Physical Devices of the same capacity, Physical Devices of larger Physical Device Numbers are preferentially used as Hot Spares.

Ex.: For the example shown below, Physical Devices #1 - #7 can be used in Easy Configuration to make two Hot Spares. Three Physical Devices have the largest capacity of 150GB. Accordingly, use Physical Devices #5 and #6 of larger Physical Device Numbers among the three Physical Devices as Hot Spares.

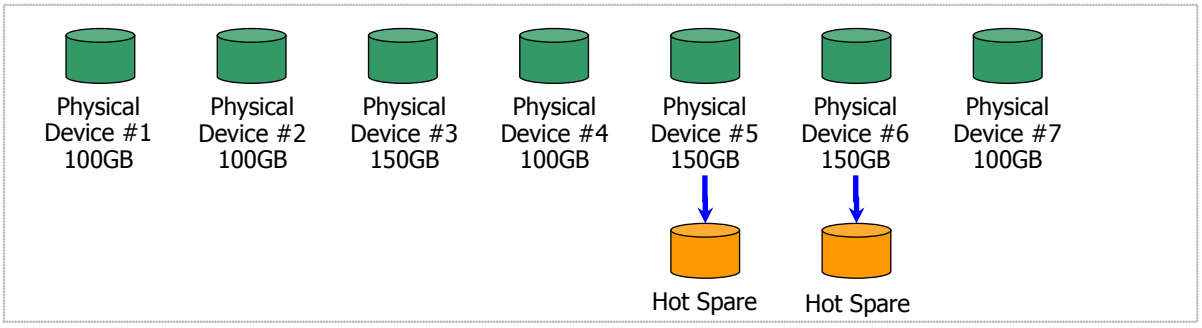


Figure 18 Assigning Hot Spares in Easy Configuration

CHECK Physical Devices in which S.M.A.R.T. errors are detected cannot be used to make Hot Spares.

Modes of Hot Spares

The Easy Configuration can only make Dedicated Hot Spares but cannot make Global Hot Spares.
If more than one Logical Drive is created, the Dedicated Hot Spare can be used for all Logical Drives to be created.

Ex.: If Physical Devices #1 - #7 are used in Easy Configuration to create two Logical Drives and a single Hot Spare, the Hot Spare will be the Dedicated Hot Spare for each Logical Drive.

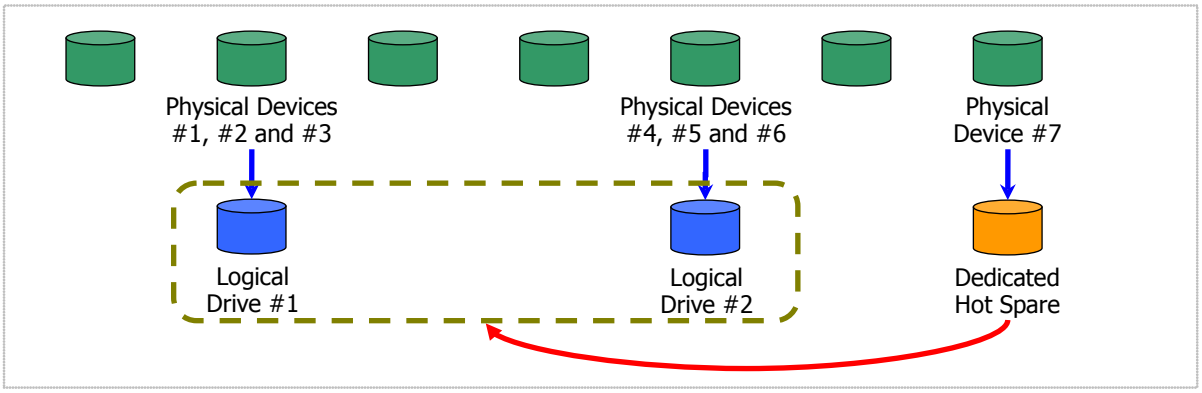


Figure 19 Making Dedicated Hot Spare in Easy Configuration 1

Ex.: If Physical Devices #1 - #8 are used in Easy Configuration to create two Logical Drives and two Hot Spares, Hot Spares #1 and #2 will be the Dedicated Hot Spares for Logical Drives #1 and #2, respectively.

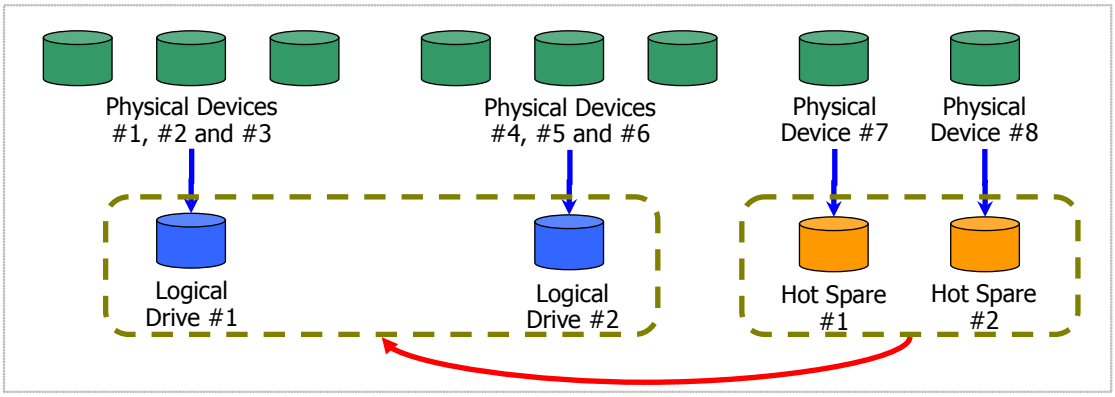


Figure 20 Making Dedicated Hot Spares in Easy Configuration 2

Creating Logical Drive Easily

The Universal RAID Utility supports "Create Logical Drive - Simple Mode" in which a Logical Drive can be created only by selecting two selection items according to the guide.

"Create Logical Drive - Simple Mode" allows you to create a Logical Drive only by specifying two selection items, or the RAID Level of the Logical Drive and Physical Devices to be used.
The benefits of creating a Logical Drive with "Create Logical Drive - Simple Mode" are as follows. The Universal RAID Utility defines selection items which you should examine to create a Logical Drive instead of you.

- Allowing a Logical Drive to be created only by specifying two selection items (RAID Level and Physical Devices to be used).
- Allowing the Universal RAID Utility to set all setting items (including Capacity and Stripe Size) other than the RAID Level and Physical Devices to be used automatically.

Operation Procedure of "Create Logical Drive - Simple Mode"

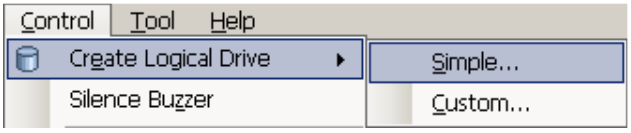
This section describes the procedure of creating a Logical Drive by "Create Logical Drive - Simple Mode".

RAID Viewer

Use [Create Logical Drive (Simple)] in [Control] menu.

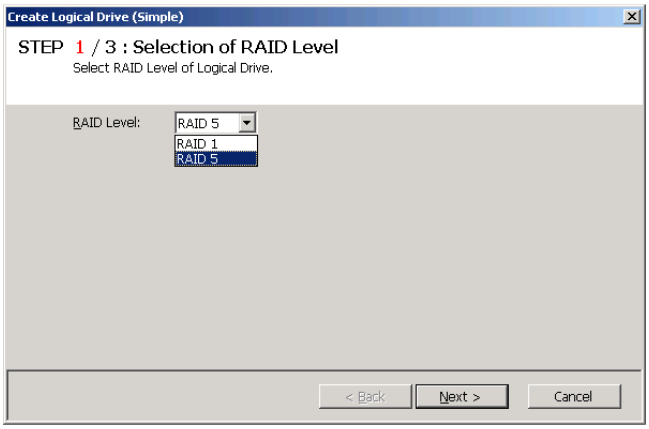
Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

Step 2 Click the RAID Controller on the Tree View, select [Create Logical Drive] on the pull-down menu of menu item [Control], and click [Simple...].

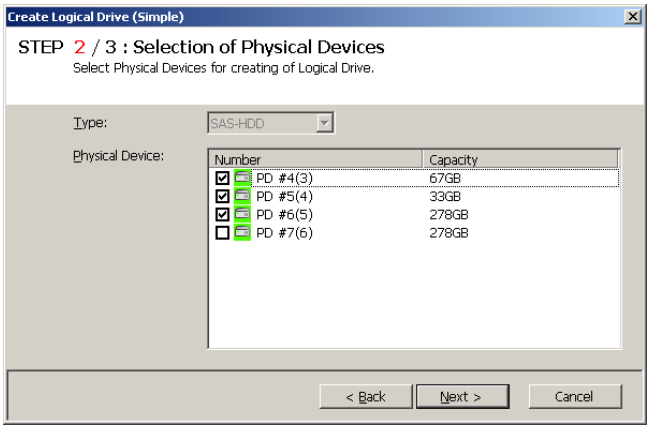


CHECK If only a single unused Physical Device exists in the RAID Controller, "Create Logical Drive - Simple Mode" is disabled.

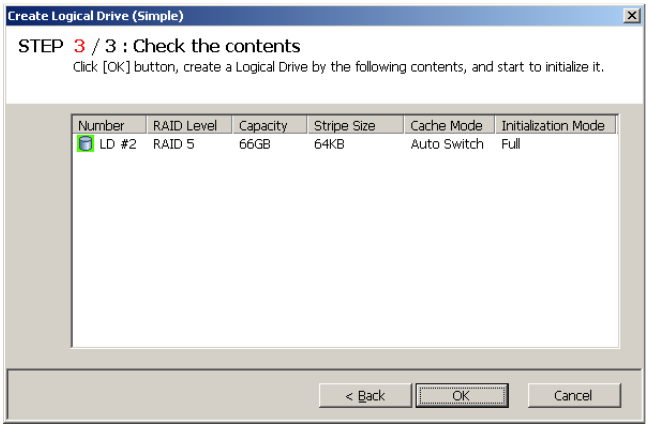
Step 3 The [Create Logical Drive (Simple)] wizard is started.
In step 1/3, select the RAID Level of the Logical Drive to be created. After the selection, click [Next].



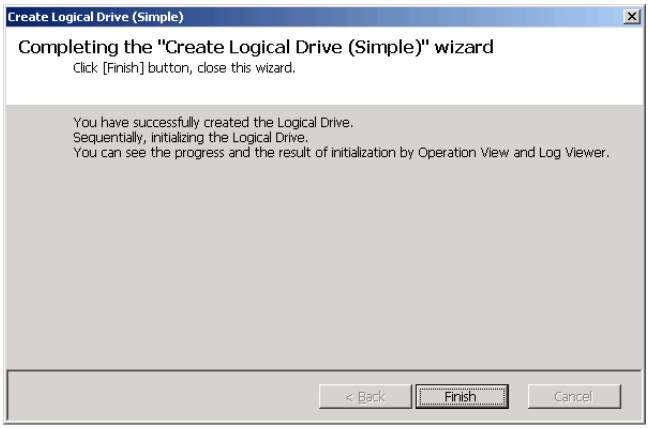
Step 4 In step 2/3, select Physical Devices to be used to create the Logical Drive. If Physical Devices of different types exist in the RAID Controller, click the type to be used on [Type]. Next, check the check boxes of Physical Devices to be used on [Physical Device]. You must select Physical Devices to be used by the number allowing the RAID Level selected in Step 1/3 to be created. After selecting Physical Devices properly, click [Next].



Step 5 Step 3/3 indicates the information on the Logical Drive to be created. Click [OK] to create the Logical Drive with the functions. Click [Back] to change one or more functions.



Step 6 In step 3/3, click [OK] to create the Logical Drive. After the Logical Drive is created completely, [Completing the "Create Logical Drive (Simple)" Wizard] appears. Now the Logical Drive has been created completely. Close the wizard and check the information on the Logical Drive on the Tree View. However, the Logical Drive having been created may not be initialized yet. Check the progress or result of the Initialize of the Logical Drive on the Operation View.


Create Logical Drive (Simple)
Completing the "Create Logical Drive (Simple)" wizard
Click [Finish] button, close this wizard.
You have successfully created the Logical Drive.
Sequentially, initializing the Logical Drive.
You can see the progress and the result of initialization by Operation View and Log Viewer.
< Back
Finish
Cancel

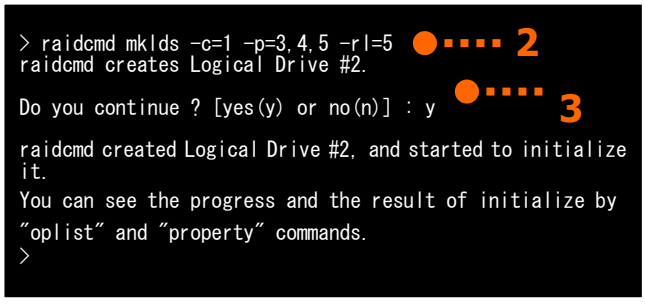
raidcmd

Use "**mklds**" command.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required.

Step 2 Execute "**mklds**" command with the following parameters.

- **-c** : Number of the RAID Controller in which a Logical Drive is created
- **-p** : Numbers of the Physical Devices with which a Logical Drive is created (The required number of Physical Devices varies depending on the RAID Level of the Logical Drive to be created).
- **-rl** : RAID Level at which a Logical Drive is made ("Create Logical Drive - Simple Mode" allows a Logical Drive with RAID Level being RAID 1 or RAID 5 to be created)


> raidcmd mklds -c=1 -p=3,4,5 -rl=5
raidcmd creates Logical Drive #2.
2
Do you continue ? [yes(y) or no(n)] : y
3
raidcmd created Logical Drive #2, and started to initialize it.
You can see the progress and the result of initialize by "oplist" and "property" commands.
>

Step 3 Type "yes" to reply to the confirmation message. Then a Logical Drive is created.

Step 4 After the Logical Drive is created completely, the raidcmd terminates normally. The Logical Drive has been created completely. You can check the information on the Logical Drive by using "**property**" command. However, the Initialize of the Logical Drive having been created may not be completed. The progress of initializing the Logical Drive can be checked by using "**oplist**" command. The result of initializing the Logical Drive can be checked by RAID Log.

Physical Devices Available for "Create Logical Drive - Simple Mode"

Unused Physical Devices are available for "Create Logical Drive - Simple Mode". Unused Physical Devices are those with their [Status] being [Ready].

Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.

Creating Logical Drives by "Create Logical Drive - Simple Mode"

This section describes the information on Logical Drives to be created by "Create Logical Drive - Simple Mode".

RAID Level

The RAID Level of a Logical Drive which can be created by "Create Logical Drive - Simple Mode" should be RAID 1 or RAID 5.

Capacity of Logical Drive

The capacity of a Logical Drive to be created is defined by the RAID Level and the capacities of Physical Devices used for the Logical Drive. In "Create Logical Drive - Simple Mode", a Logical Drive is created by using the entire areas of the Physical Devices.

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection item	Value
Stripe Size	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Cache Mode	Uses the default value set for the RAID Controller. (The value varies depending on the type of the RAID Controller.)
Initialize Mode	Full

Creating Logical Drive Freely

The Universal RAID Utility supports "Create Logical Drive - Custom Mode" in which a Logical Drive can be created as required by specifying the setting items of the Logical Drive closely.

"Create Logical Drive - Custom Mode" allows you to create a Logical Drive by specifying the setting items of the Logical Drive closely. It can also be used to create Logical Drives of several RAID Levels or create a Logical Drive by using unused area of Disk Array. In addition, "Create Logical Drive - Custom Mode" enables more than one Logical Drive to be created at a time.
The benefits of creating Logical Drives by "Create Logical Drive - Custom Mode" are as follows:

- Allows Logical Drives of various RAID Levels (RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, and RAID 50) to be created.
- Allows selection items (including Capacity, Stripe Size, Cache Mode and Initialize Mode) to be specified closely.
- Allows not only unused Physical Devices but also unused area of Disk Array to be used to create a Logical Drive of RAID 0, RAID 1, RAID 5, or RAID 6.
- Allows more than one Logical Drive to be created by a set of operations (only RAID Viewer).

Operation Procedure of "Create Logical Drive - Custom Mode"

This section describes the procedure of creating a Logical Drive by "Create Logical Drive - Custom Mode".

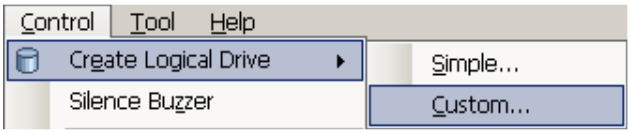
"Create Logical Drive - Custom Mode" is available only in the Advanced Mode.

RAID Viewer

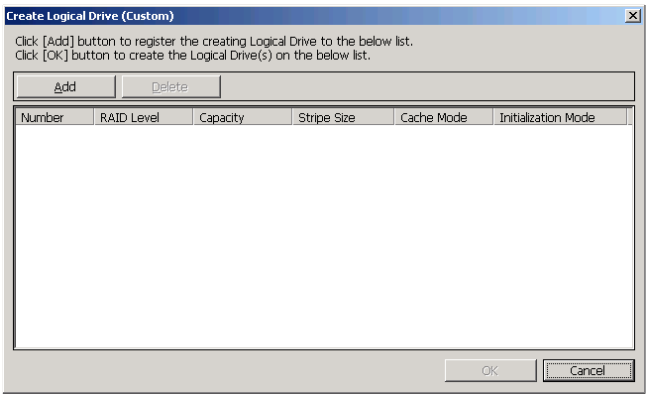
Use [Create Logical Drive(Custom)] in [Control] menu.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required. If the Physical Devices are connected completely, start the RAID Viewer.

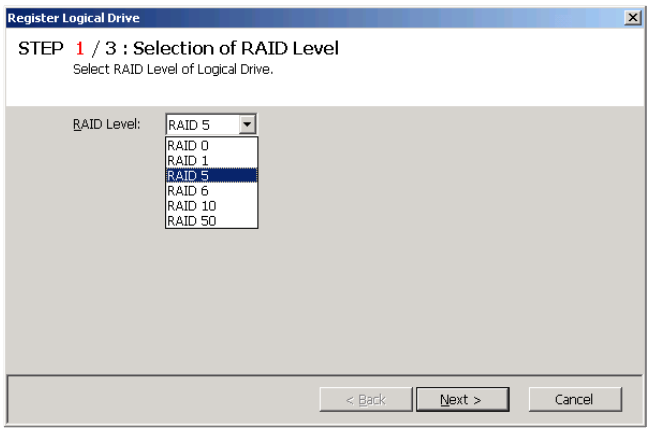
Step 2 Change the RAID System Management Mode to the Advanced Mode if it is set to the Standard Mode. To do this, click [Advanced Mode] on the pull-down menu of menu item [Tool].
Click a RAID Controller on the Tree View, select [Create Logical Drive] on the pull-down menu of menu item [Control], and click [Custom...].



Step 3 The [Create Logical Drive (Custom)] dialog box is started. In the Custom Mode, register a Logical Drive to be created to the list of the dialog box. If the Logical Drive may be registered, click [Add]. To delete a registered Logical Drive, click the Logical Drive to be deleted and click [Delete].



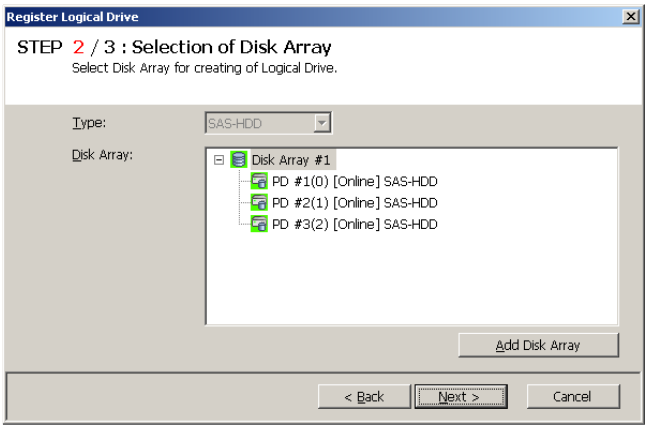
Step 4 If you click [Add] in the [Create Logical Drive (Custom)] dialog box, the [Register Logical Drive] wizard is started. In step 1/3, select the RAID Level of the Logical Drive to be registered. After the selection, click [Next].



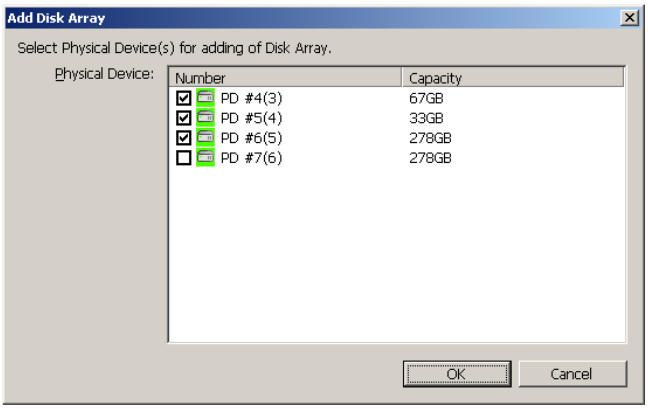
Step 5 In step 2/3, the operation varies depending on the RAID Level selected in step 1/3.

(1) When RAID 0, RAID 1, RAID 5, or RAID 6 is selected as the RAID Level, select a Disk Array to be used for the Logical Drive.

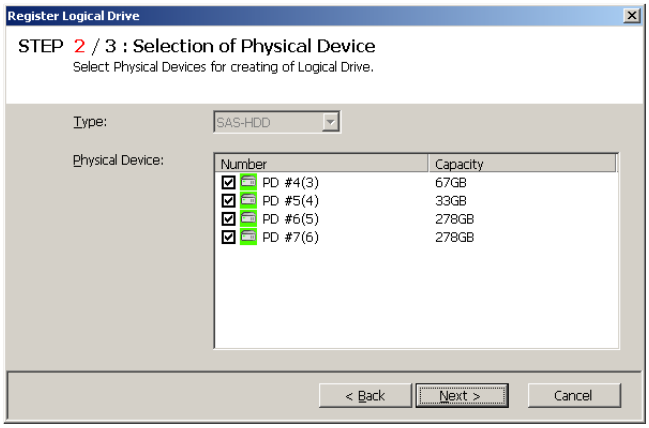
If the RAID Controller contains Physical Devices of different types, click the type to be used on [Type]. Next, click the Disk Array node to be used on [Disk Array]. After the selection, click [Next].



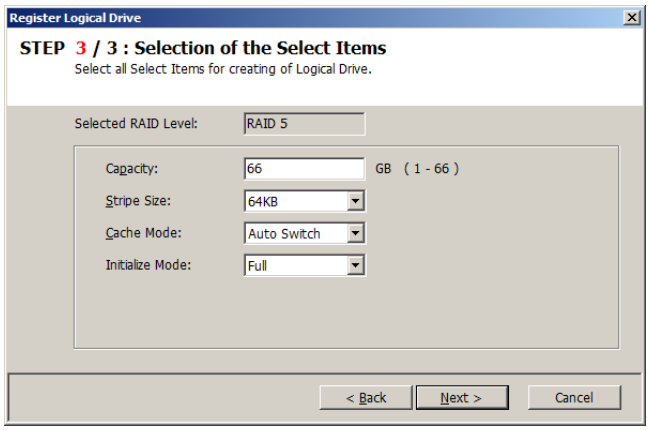
To create a Disk Array to be used newly, click [Add Disk Array]. Then the [Add Disk Array] dialog box appears. Check the check boxes of Physical Devices to be used for the added Disk Array by the number required for the RAID Level to be created. Then click [OK]. The newly created Disk Array is added to [Disk Array] in step 2/3 of the [Register Logical Drive] wizard.



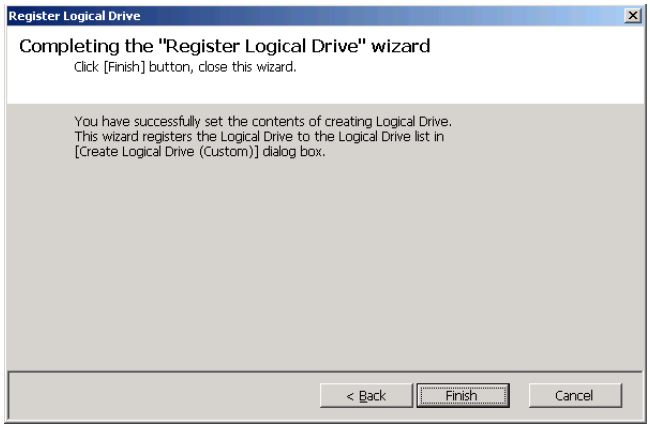
(2) RAID 10 or RAID 50 is select as the RAID Level, select Physical Devices used for the Logical Drive. For RAID 10, check the check boxes of four Physical Devices. For RAID 50, check the check boxes of six or larger Physical Devices. Further, the number of Physical Devices should be even. After the selection, click [Next].



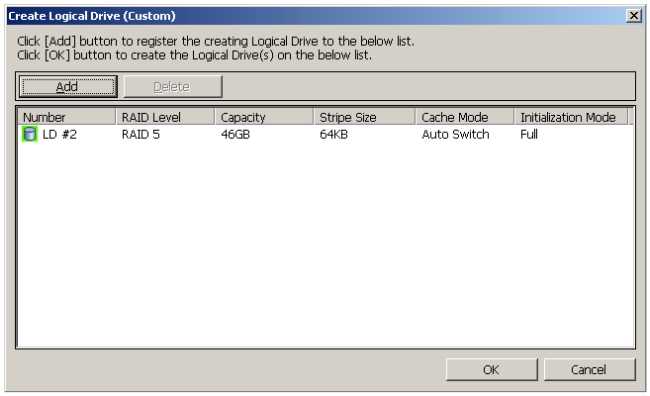
Step 6 In step 3/3, select the setting items of the Logical Drive to be registered. [Capacity] should be a value within the Capacity of the Logical Drive to be created. If the RAID Level of the Logical Drive to be created is RAID 10 or RAID 50, you may not enter the value. Select [Stripe Size], [Cache Mode] and [Initialize Mode]. After selecting all the setting items, click [Next].



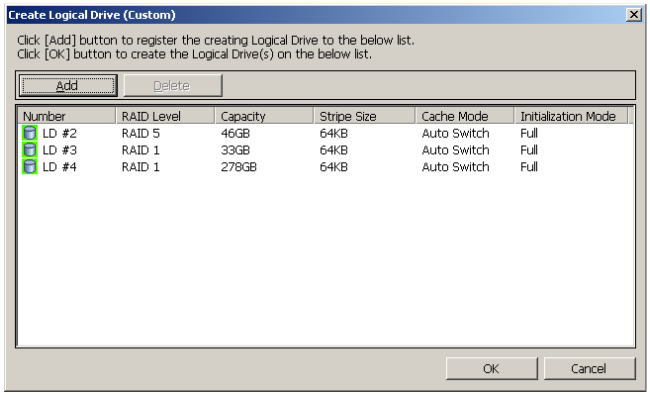
Step 7 If you click [Next] in step 3/3, then [Completing the "Register Logical Drive" Wizard] will appear. Click [Finish] to register the Logical Drive with the data selected on the wizard. To change some data, click [Back].


Register Logical Drive
Completing the "Register Logical Drive" wizard
Click [Finish] button, close this wizard.
You have successfully set the contents of creating Logical Drive.
This wizard registers the Logical Drive to the Logical Drive list in
[Create Logical Drive (Custom)] dialog box.
< Back
Finish
Cancel

Step 8 At the completion of the [Register Logical Drive] wizard, the Logical Drive is registered in the list of the [Create Logical Drive (Custom)] dialog box.



Step 9 To create other Logical Drives, click [Add] and repeat steps 4 to 8 by the number of Logical Drives to be created.
After registering all Logical Drives to create, click [OK]. Then the dialog box is closed and the registered Logical Drives are created. Check the contents of the Logical Drives on the Tree View and/or their properties. However, the Initialize of the Logical Drives having been created may not be completed. The progress and result of initializing the Logical Drives can be checked on the Operation View.

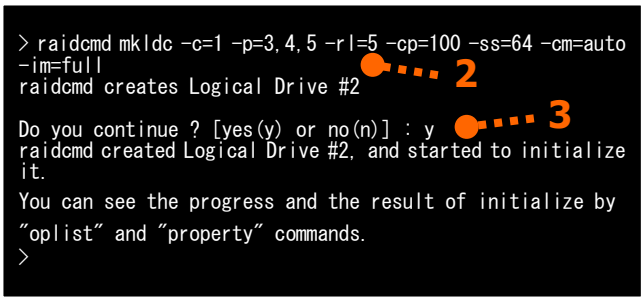


raidcmd

Use "**mkldc**" command. A count of Logical Drive created by raidcmd is 1 at same time.

Step 1 Connect Physical Devices used for a Logical Drive to the RAID Controller at this timing if required.

Step 2 Execute "**mkldc**" command with the following parameters.


> raidcmd mkldc -c=1 -p=3,4,5 -rl=5 -cp=100 -ss=64 -cm=auto -im=full
raidcmd creates Logical Drive #2
2
Do you continue ? [yes(y) or no(n)] : y
3
raidcmd created Logical Drive #2, and started to initialize it.
You can see the progress and the result of initialize by "oplist" and "property" commands.
>

-c : Number of the RAID Controller in which a Logical Drive is created
-p : Numbers of the Physical Devices used to create a Logical Drive if used(The required number of Physical Devices varies depending on the RAID Level of the Logical Drive to be created)
-a : Number of the Disk Array used to create a Logical Drive if used
-rl : RAID Level of a Logical Drive to be created("Create Logical Drive - Custom Mode" allows a Logical Drive with RAID Level being RAID 0 RAID 1, RAID 5, RAID 6, RAID 10, RAID 50 to be created)
-cp : Capacity of a Logical Drive to be created(This value may be omitted if a Logical Drive is created by using unused Physical Devices entirely)
-ss : Stripe Size of a Logical Drive to be created(This value may not be specified if the default value for the RAID Controller is used)
-cm : Cache Mode of a Logical Drive to be created(This value may not be specified if the default value for the RAID Controller is used)
-im : Operation mode for Initialize executed after a Logical Drive is created(The [Full] mode is recommended. In the [Full] mode, the Initialize Mode may not be specified)

Step 3 Type "yes" to reply to the confirmation message. Then a Logical Drive is created.

Step 4 After the Logical Drive is created completely, the raidcmd terminates normally. The Logical Drive has been created completely. You can check the information on the Logical Drive by using "**property**" command. However, the Initialize of the Logical Drive having been created may not be completed. The progress of initializing the Logical Drive can be checked by using "**oplist**" command. The result of initializing the Logical Drive can be checked by RAID Log.

Disk Arrays and Physical Devices Available for "Create Logical Drive - Custom Mode"

For "Create Logical Drive - Custom Mode", Disk Arrays or unused Physical Devices are available depending on the RAID Level of the Logical Drive to be created.

CHECK

- Physical Devices in which S.M.A.R.T. errors are detected cannot be used to create Logical Drives.
- Disk Array which does not have any Logical Drive cannot be used to create Logical Drives.

Logical Drive with RAID Level being RAID 0, RAID 1, RAID 5 or RAID 6

Disk Arrays containing empty areas or unused Physical Devices are available for creating a Logical Drive with the RAID Level being RAID 0, RAID 1, RAID 5, or RAID 6.
Among empty areas in a Disk Array, the empty area existing at the end of the Disk Array can be used. The RAID Level of a Logical Drive to be created must be the same as that of the Logical Drives existing in the area used on the Disk Array.
If unused Physical Devices are used, create a Disk Array and create a Logical Drive on it. Unused Physical Devices are those with their [Status] being [Ready].

Logical Drive with RAID Level being RAID 10 or RAID 50

Only unused Physical Devices are available for Logical Drives with RAID Level being RAID 10 or RAID 50.
Unused Physical Devices are those with their [Status] being [Ready].

Creating Logical Drives by "Create Logical Drive - Custom Mode"

This section describes the information on Logical Drives to be created by "Create Logical Drive - Custom Mode".

RAID Levels

The RAID Level of a Logical Drive which can be created by "Create Logical Drive - Custom Mode" should be RAID 0, RAID 1, RAID 5, RAID 6, RAID 10, or RAID 50.

Supported RAID Levels vary in RAID Controllers. Unsupported RAID Levels cannot be selected.

Capacity of Logical Drive

A Logical Drive to be created in the Custom Mode can have any capacity. However, a Logical Drive with the RAID Level being RAID 10 or RAID 50 must be created by using the entire areas of Physical Devices.

Items set for Logical Drive

The values of other selection items set for a Logical Drive to be created are defined as shown in the table below.

Selection Item	Value
Stripe Size	Select a value out of 1KB, 2KB, 4KB, 8KB, 16KB, 32KB, 64KB, 128KB, 256KB, 512KB, and 1024KB.
Cache Mode	Three possible values are as follows: Auto Switch: Switches the mode automatically between Write Back and Write Through depending on the existence and/or status of Battery. Write Back: Writes data to the cache memory asynchronously. Write Through: Writes data to the cache memory synchronously.
Initialize Mode	Two possible values are as follows: Full: Initializes both the management and data areas in the Logical Drive. Quick: Initializes only the management information in the Logical Drive.

Supported Stripe Sizes and cache mode vary in RAID Controllers. Unsupported Stripe Sizes and cache modes cannot be selected.

Deleting Logical Drive

The Universal RAID Utility can delete a Logical Drive becoming unnecessary.

IMPORTANT

- **The function of deleting a Logical Drive is available only in the Advanced Mode.**
- **You can delete Logical Drive with partitions. Before deleting a Logical Drive, check if the Logical Drive contains required data. Deleting a Logical Drive causes all the data saved in the Logical Drive to be lost.**

CHECK

You can delete only the Logical Drive that is located at the end of Disk Array.

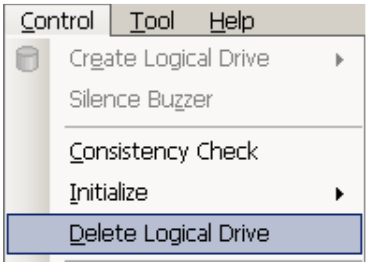
Deleting Logical Drive

The procedure of deleting a Logical Drive is described below.

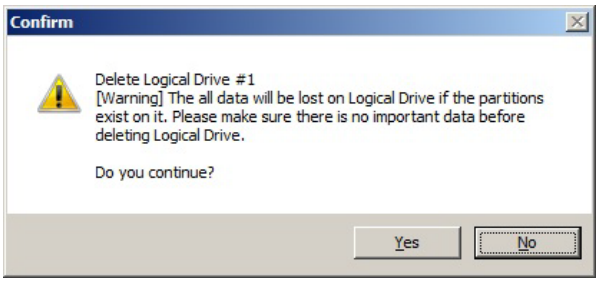
RAID Viewer

Use [Delete Logical Drive] in [Control] menu.

Step 1 Start the RAID Viewer. Click the Logical Drive to be deleted on the Tree View. Click [Delete Logical Drive] on the pull-down menu of menu item [Control].



Step 2 Click [yes] on the dialog box shown to the right to run the delete. Click [No] to abort the delete Logical Drive.


Confirm
Delete Logical Drive #1
[Warning] The all data will be lost on Logical Drive if the partitions exist on it. Please make sure there is no important data before deleting Logical Drive.
Do you continue?
Yes
No

raidcmd

Use "**delld**" command.

Step 1 Execute "**delld**" command with the following parameters.

-**c** : Number of the RAID Controller containing the Logical Drive to be deleted
-**l** : Number of the Logical Drive to be deleted

```
> raidcmd delld -c=1 -l=2 ●···· 1
Delete Logical Drive #2
[Warning]
The all data will be lost on Logical Drive if the partitions
exist on it.
Please make sure there is no important data before deleting
Logical Drive.

Do you continue ? [yes(y) or no(n)] : yes ●···· 2
>
```

Step 2 Displays the Warning message and the confirmation message. Type "yes" to reply to the confirmation message. Then a Logical Drive is deleted. Type "No" to abort the delete Logical Drive.

Maintenance of RAID System

This chapter describes the maintenance of a RAID System using the Universal RAID Utility.

Providing Patrol Read for Physical Devices

The Patrol Read function reads data saved in all Physical Devices in a RAID System entirely to check whether a read error occurs or not regularly in the background. The Patrol Read is effective to find failures including Physical Device medium error early. Be sure to execute Patrol Read for a RAID Controller if it supports the Patrol Read.
The Universal RAID Utility provides the function of indicating whether Patrol Read is executed or not and the function of changing the Patrol Read Priority.

Setting Whether Patrol Read Is Executed or Not

Whether Patrol Read is executed or not should be set in RAID Controllers. The procedure of setting whether Patrol Read is executed or not is described below.

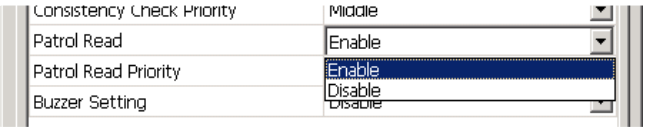
> **IMPORTANT** **Changing the setting whether Patrol Read is executed or not is available only in the Advanced Mode.**

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click a RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Patrol Read] to [Enable] or [Disable]. Click [OK] or [Apply].



> **TIPS** RAID Controllers of some types may not support Patrol Read. If the Patrol Read is not supported, items [Patrol Read] and [Patrol Read Priority] on the [Options] tab do not appear.

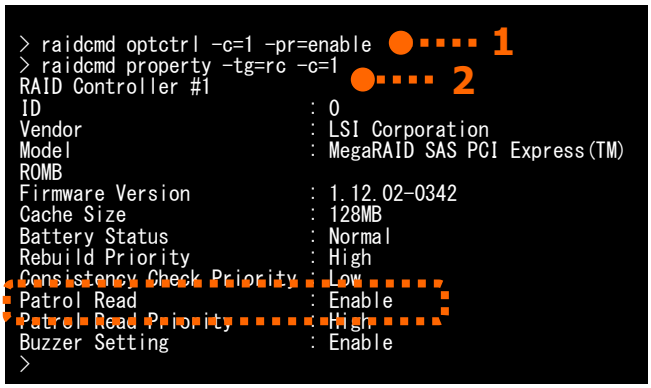
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -pr option and the following parameters.

-c : Number of the RAID Controller for which whether Patrol Read is executed or not is set
-pr : Specify "enable" to allow Patrol Read / Specify "disable" not to allow Patrol Read.

Step 2 Check the execution result by using "**property**" command. The following parameter of RAID Controller is changed.
[Patrol Read] : "enable" to allow Patrol Read
"disable" not to allow Patrol Read



Checking Result of Executing Patrol Read

You can find the result of executing Patrol Read by checking the RAID Log of the Universal RAID Utility. When detects something problem, Universal RAID Utility records the log in the RAID Log.

Setting Patrol Read Priority

You can set the priority in which Patrol Read is executed in your computer. The procedure of setting the Patrol Read Priority is described below.

IMPORTANT **Changing the priority of Patrol Read is available only in the Advanced Mode.**

RAID Viewer

Change the property of RAID Controller on RAID Viewer.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Patrol Read Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].

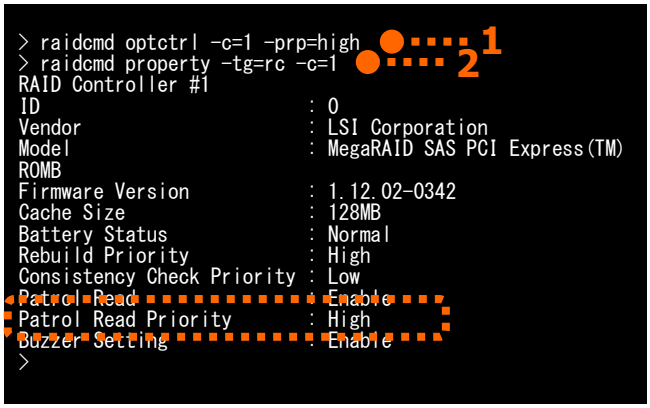
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -prp option and the following parameters.

-c : Number of the RAID Controller for which Patrol Read Priority is set
-prp : Value set after Patrol Read Priority is changed(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Checking Logical Drive Consistency

The Consistency Check function checks the consistency between the data in the data area of a Logical Drive and the parity. The Universal RAID Utility can start or stop Consistency Check and change the priority in which Consistency Check is executed.
The Consistency Check is effective next to Patrol Read to find failures including Physical Device medium error early. Execute Consistency Check periodically if the RAID Controller does not support Patrol Read. If the Universal RAID Utility is installed, routine execution of the Consistency Check is set for RAID Controllers not supporting Patrol Read.

IMPORTANT **Starting or stopping the Consistency Check is enabled both in the Standard Mode and Advanced Mode. The function of changing the priority at which the Consistency Check is executed is available only in the Advanced Mode.**

Executing Consistency Check Manually

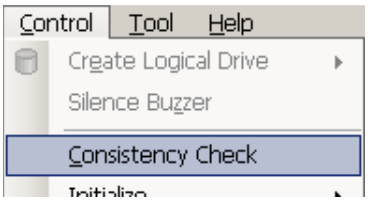
Consistency Check is executed in Logical Drives. The procedure of starting Consistency Check is described below.

TIPS The Consistency Check can be executed only for Logical Drives with [Status] being [Online].
The Consistency Check cannot be executed for Logical Drives with RAID Level being RAID 0.

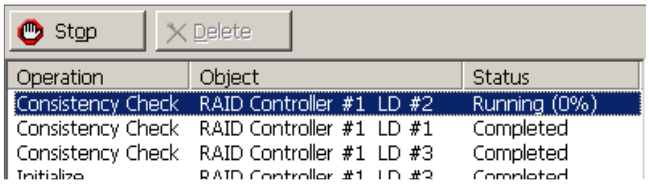
RAID Viewer

Use [Consistency Check] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Logical Drive on the Tree View. Then click [Consistency Check] on the pull-down menu of menu item [Control].



Step 2 After Consistency Check is started, the progress of the Consistency Check appears on the Operation View. At the completion of the Consistency Check, [Status] on the Operation View is changed to [Completed].



raidcmd

Use "**cc**" command.

Step 1 Execute "**cc**" command with -op option and the following parameters.

-c : Number of the RAID Controller containing the Logical Drive for which Consistency Check is executed (If specify "all" as parameter, the targets are all Logical Drives of all RAID Controllers)
-l : Number of the Logical Drive for which Consistency Check is executed (If specify "all" as parameter, the targets are all Logical Drives of RAID Controllers specified by -c)
-op : Specify "start" to start Consistency Check

Step 2 After the Consistency Check is started, the raidcmd terminates normally. Check the execution status of the Consistency Check by using "**oplist**" command.

Executing Consistency Check for arbitrary Logical Drive

The Universal RAID Utility makes a task for scheduled execution of Consistency Check so that a RAID Controller not supporting Patrol Read can find failures including medium error early. To execute Consistency Check for arbitrary Logical Drive by raidcmd, use the function of scheduler as Task of Windows or cron of Linux and VMware ESX. Universal RAID Utility make the task for a RAID Controller which does not support Patrol Read that execute consistency check for arbitrary Logical Drive.

When you set the Patrol Read to "Disable", Universal RAID Utility execute Consistency Check with the function of scheduler as Task.

Tasks provided by Universal RAID Utility (Windows)

The Universal RAID Utility registers a task such as that shown in the table below in a Windows task if it is installed.
The Windows task can be used to change the schedule of executing Consistency Check or delete tasks. For how to use tasks, see the Windows help.

Item	Description
Task name	Consistency Check
Execution day of the week	Wednesday
Starting time	AM 0:00
Execution command	(Universal RAID Utility installation folder)\cli\raidcmd.exe ccs
Execution account	NT AUTHORITY\SYSTEM

Note the following point when changes the setting of the task on operating system excluding Windows Server 2003 and Windows XP.
- Specify "/V1" option with "/Create" option when uses schtasks command for changing the setting of the task.
- Do not change the [Configure for] of the task of "Consistency Check".
If does not specify "/V1" option or changes [Configure for] of the task, this task is going to remain in your computer after uninstalling Universal RAID Utility. When this task remains after uninstalling Universal RAID Utility, delete it.

Task provided by Universal RAID Utility (Linux, VMware ESX)

The Universal RAID Utility registers a task such as that shown in the table below in a Linux cron if it is installed.
The functions of cron can be used to change the schedule of executing Consistency Check or delete tasks. For how to use cron, see the cron(8),crontab(1),crontab(5) by "man" command.

Item	Description
Execution day of the week	Wednesday
Starting time	AM 0:00
Execution command	/opt/nec/raidcmd/raidcmd ccs
Execution account	root

Executing Consistency Check for all Logical Drives for RAID Controller not supporting Patrol Read

To execute Consistency Check for all Logical Drives of a RAID Controller not supporting Patrol Read, use "**ccs**" command of the raidcmd.

Stopping Consistency Check

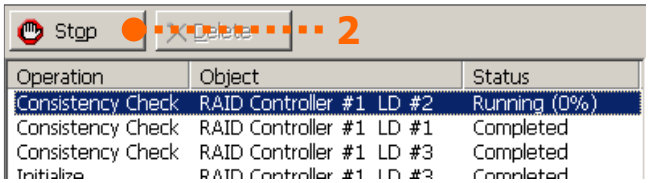
You can stop Consistency Check being executed on the way. The procedure of stopping Consistency Check is described below.

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Consistency Check is executed.

Step 2 Click operation [Consistency Check] which you want to stop. Click [Stop] on the Operation View. After the Consistency Check is stopped, [Status] on the Operation View is changed to [Stopped].



raidcmd

Use "**cc**" command.

Step 1 Execute "**cc**" command with -op option and the following parameters.

-c : Number of the RAID Controller containing the Logical Drive for which Consistency Check is stopped (If specify "all" as parameter, the targets are all Logical Drives of all RAID Controllers)
-l : Number of the Logical Drive for which Consistency Check is stopped (If specify "all" as parameter, the targets are all Logical Drives of RAID Controllers specified by -c)
-op : Specify "stop" to stop Consistency Check

Step 2 After the Consistency Check is stopped, the raidcmd terminates normally. The stopped Consistency Check disappears from the list of "**oplist**" command.

Checking Result of Executing Consistency Check

You can find the result of executing Consistency Check by checking the RAID Log of the Universal RAID Utility. Detecting a problem, the Consistency Check records the log in the RAID Log.

Setting Consistency Check Priority

You can set the priority at which Consistency Check is executed in the computer. The procedure of setting the Consistency Check Priority is described below.

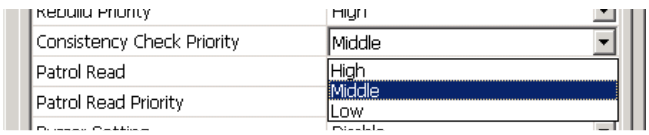
Setting Consistency Check Priority are available only in the Advanced Mode.

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Consistency Check Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



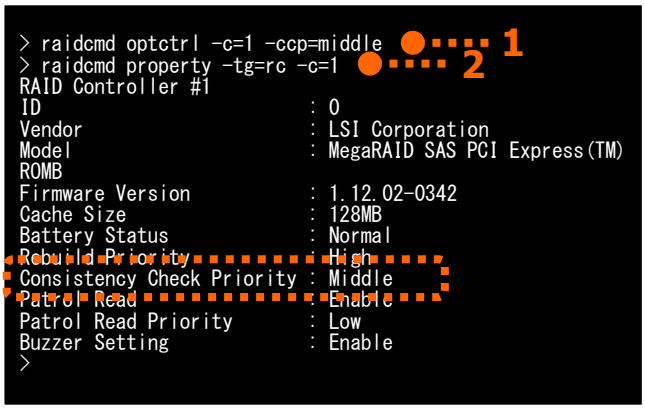
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -ccp option and the following parameters.

-c : Number of the RAID Controller for which Consistency Check Priority is set
-ccp : Value set after Consistency Check Priority is set(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Initializing Logical Drive

The Initialize writes 0s into the entire area of a Logical Drive to erase the data saved in the Logical Drive. Use the function when you want to erase the data saved in a Logical Drive fully.
Initialize has two modes listed in the table below.

Mode	Description
Full	Writes 0s into the entire area of a Logical Drive to erase the data fully.
Quick	Writes 0s into some blocks in a Logical Drive. Only erases OS installation and partition management information. Initialize of the mode is completed earlier than that of the full mode. However, because 0s are not written into the remaining area, data consistency is not held in the Logical Drive.

IMPORTANT

- **Initialize are available only in the Advanced Mode.**
- **You can initialize Logical Drive with partitions. Before initializing Logical Drive, check if the Logical Drive contains required data. Initializing a Logical Drive causes all the data saved in the Logical Drive to be lost.**

CHECK

The Consistency Check of a Logical Drive initialized in the quick mode causes a data inconsistency error to occur due to no data consistency.

Executing Initialize

Initialize should be executed in Logical Drives. The procedure of executing Initialize is described below.

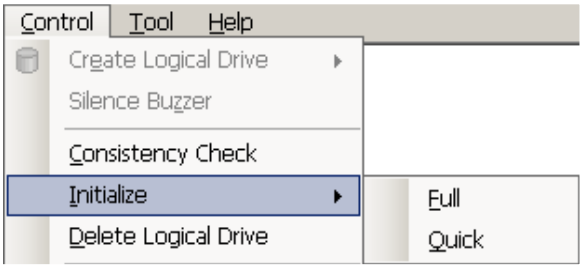
TIPS

Initialize cannot be executed for any Logical Drive with [Status] being [Online].

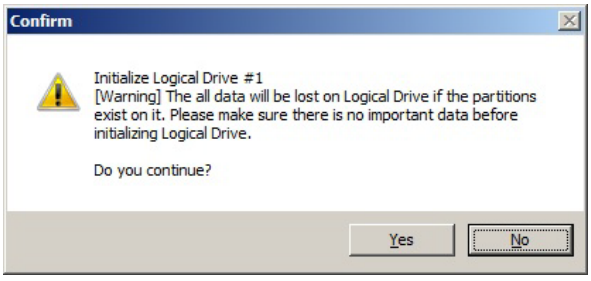
RAID Viewer

Use [Initialize] in [Control] menu.

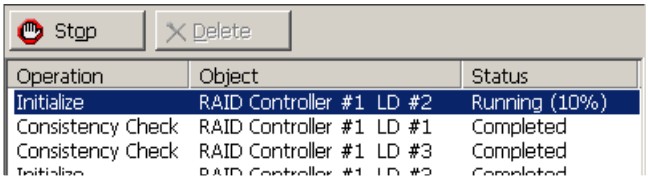
Step 1 Start the RAID Viewer. Click a Logical Drive on the Tree View. Select [Initialize] on the pull-down menu of menu item [Control] and click [Full] or [Quick].



Step 2 Click [yes] on the dialog box shown to the right to run the initialize. Click [No] to abort the initialize Logical Drive.


Confirm
Initialize Logical Drive #1
[Warning] The all data will be lost on Logical Drive if the partitions exist on it. Please make sure there is no important data before initializing Logical Drive.
Do you continue?
Yes
No

Step 3 After Initialize is started, the progress of the Initialize appears on the Operation View.
At the completion of the Initialize, [Status] on the Operation View is changed to [Completed].



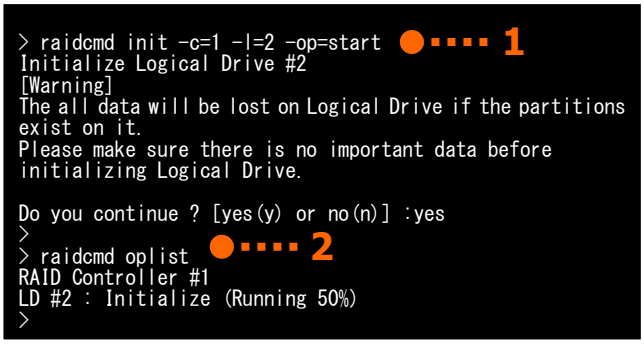
raidcmd

Use "**init**" command.

Step 1 Execute "**init**" command with -op option and the following parameters.

-c : Number of the RAID Controller containing the Logical Drive for which Initialize is started
-l : Number of the Logical Drive for which Initialize is started
-op : Specify "start" to start Initialize

Step 2 After the Initialize is started, the raidcmd terminates normally. Check the execution status of the Initialize by using "**oplist**" command.


> raidcmd init -c=1 -l=2 -op=start
1
Initialize Logical Drive #2
[Warning]
The all data will be lost on Logical Drive if the partitions exist on it.
Please make sure there is no important data before initializing Logical Drive.
Do you continue ? [yes(y) or no(n)] :yes
>
> raidcmd oplist
2
RAID Controller #1
LD #2 : Initialize (Running 50%)
>

Stopping Initialize

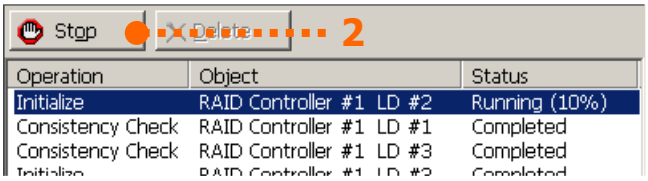
You can stop Initialize being executed on the way. The procedure of stopping Initialize is described below.

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Initialize is executed.

Step 2 Click operation [Initialize] which you want to stop. Then click [Stop] on the Operation View. After the Initialize is stopped, [Status] on the Operation View is changed to [Stopped].

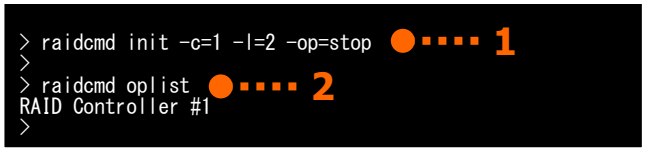


raidcmd

Use "**init**" command.

Step 1 Execute "**init**" command with -op option and the following parameters.

-c : Number of the RAID Controller containing the Logical Drive for which Initialize is stopped
-l : Number of the Logical Drive for which Initialize is stopped
-op : Specify "stop" to stop Initialize



Step 2 After the Initialize is stopped, the raidcmd terminates normally. The stopped Initialize disappears from the list of "**oplist**" command.

Checking Result of Executing Initialize

You can find the result of executing Initialize by checking the RAID Log of the Universal RAID Utility.
Detecting a problem, the Initialize records the log in the RAID Log.

Setting Initialize Priority

You can set the priority at which Initialize is executed in the computer. The procedure of setting the Initialize Priority is described below.

Setting Initialize Priority are available only in the Advanced Mode.

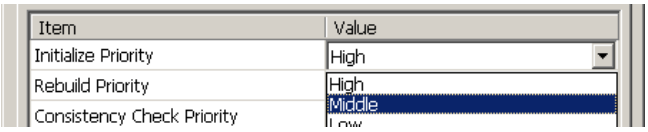
RAID Controllers of some types may not support the setting Initialize Priority. If does not support this function, RAID Viewer and raidcmd do not display this item in the property of RAID Controller and the execution of "**optctrl**" command of raidcmd fails.

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Initialize Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].



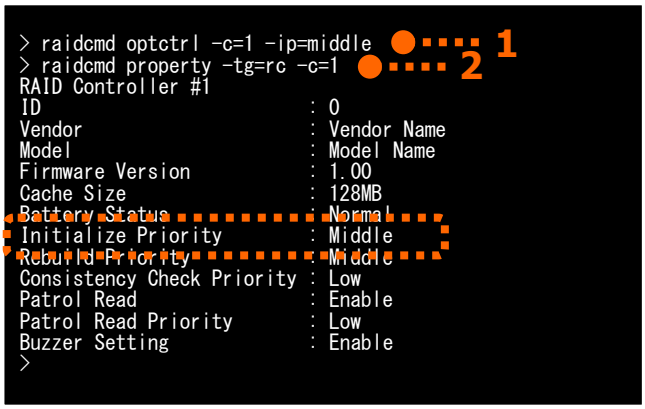
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -ip option and the following parameters.

-c : Number of the RAID Controller for which Initialize Priority is set
-ip : Value set after Initialize Priority is set(Select a value out of high, middle, and low)

Step 2 Check the execution result by using "**property**" command.



Changing Cache Mode of Logical Drive

You can change the cache mode of Logical Drive.

The setting of the cache mode of Logical Drive influences the performance of computer. Please change carefully.

Changing cache mode

The procedure of changing cache mode of Logical Drive is described below.
The range of change differs depending on the type of the RAID Controller.

RAID Controller	Changed cache	Range of change
Onboard RAID Controller (LSI Embedded MegaRAID™)	Hard Disk Drive	All the Logical Drives in a single Disk Array.
Option and Internal RAID Controller	RAID Controller (You can change each of Logical Drive.)	Only the Logical Drive selected

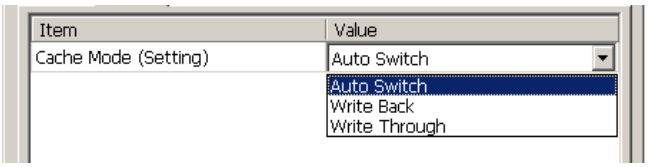
Changing cache mode is available only in the Advanced Mode.

RAID Viewer

Change the property of Logical Drive.

Step 1 Start the RAID Viewer. Click the Logical Drive on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [Logical Drive Properties] dialog box. Change the value of [Cache Mode (Setting)] to [Auto Switch], [Write Back], or [Write Through]. Click [OK] or [Apply].



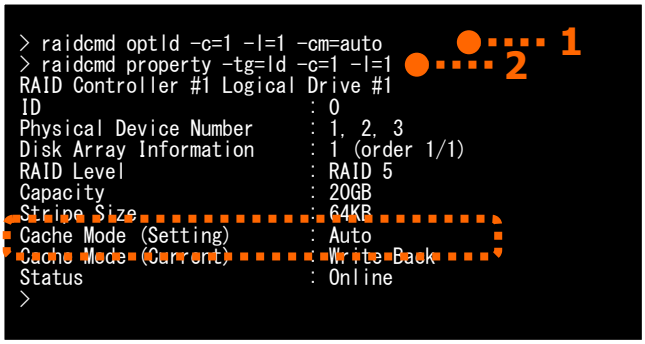
raidcmd

Use "**optld**" command.

Step 1 Execute "**optld**" command with -cm option and the following parameters.

-c : Number of the RAID Controller for which Cache Mode change
-l : Number of the Logical Drive for which Cache Mode change
-cm : Value set after Cache Mode is set (Select a value out of auto, writeback, or writethru)

Step 2 Check the execution result by using "**property**" command.


> raidcmd optld -c=1 -l=1 -cm=auto
> raidcmd property -tg=ld -c=1 -l=1
RAID Controller #1 Logical Drive #1
ID : 0
Physical Device Number : 1, 2, 3
Disk Array Information : 1 (order 1/1)
RAID Level : RAID 5
Capacity : 20GB
Stripe Size : 64KB
Cache Mode (Setting) : Auto
Cache Mode (Current) : Write Back
Status : Online
>
1
2

Rebuilding Physical Device

Rebuild means incorporation of a new Physical Device to a Logical Drive after a Physical Device is replaced with the new one due to occurrence of an event such as a failure. In general, the Rebuild is automatically started by a function of the RAID Controller called standby rebuild or hot-swap rebuild. Accordingly, manual Rebuild is not required so often. If required, use the Universal RAID Utility.

> **IMPORTANT** **Manual Rebuild is available only in the Advanced Mode.**

Executing Rebuild

Rebuild is executed for a Physical Device. The procedure of executing Rebuild is described below.

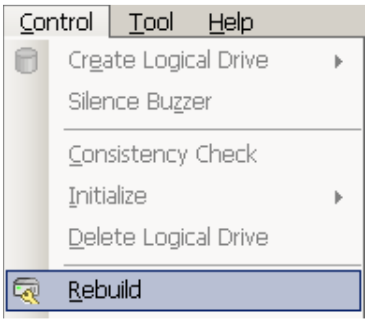
> **TIPS** Rebuild can be executed if [Status] of a Physical Device is set to [Failed] and [Status] of the Logical Drive using the Physical Device is set to [Degraded].

RAID Viewer

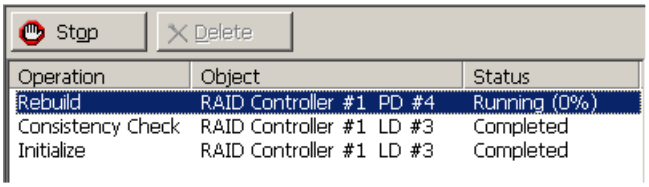
Use [Rebuild] in [Control] menu.

Step 1 Connect the Physical Device used for Rebuild to a RAID Controller at this timing if required. If the Physical Device is connected completely, start the RAID Viewer.

Step 2 Click the Physical Device used for the Rebuild on the Tree View. Then click [Rebuild] on the pull-down menu of menu item [Control].



Step 3 After the Rebuild is started, the progress of the Rebuild appears on the Operation View. At the completion of the Rebuild, [Status] on the Operation View is changed to [Completed].



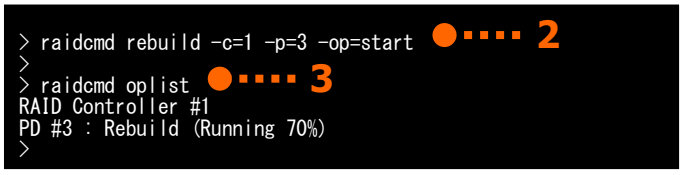
raidcmd

Use "**rebuild**" command.

Step 1 Connect the Physical Device used for Rebuild to a RAID Controller at this timing if required.

Step 2 Execute "**rebuild**" command with -op option and the defined parameters.

-c : Number of the RAID Controller containing the Physical Device for which Rebuild is executed
-p : Number of the Physical Device for which Rebuild is executed
-op : Specify "start" to start Rebuild



Step 3 After the Rebuild is started, the raidcmd terminates normally. Check the execution status of the Rebuild by using "**oplist**" command.

Stopping Rebuild

You can stop Rebuild being executed on the way. The procedure of stopping Rebuild is described below.

The function of stopping Rebuild is available only in the Advanced Mode.

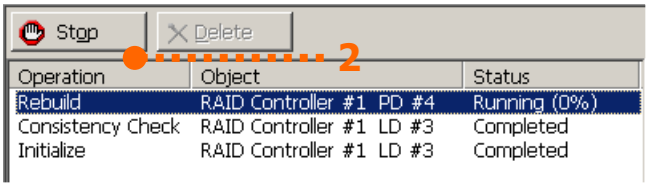
Some types of RAID Controller do not support stopping rebuild. If it does not support this function, the stop button of operation view of RAID Viewer does not become enable. When the "-op" option of raidcmd "**rebuild**" is "stop", the message saying it is not supported is displayed and the command is terminated.

RAID Viewer

Use [Stop] on Operation View.

Step 1 Start the RAID Viewer. See [Operation View] while Rebuild is executed.

Step 2 Click operation [Rebuild] which you want to stop. Then click [Stop] on the Operation View. After the Rebuild is stopped, [Status] on the Operation View is changed to [Stopped].

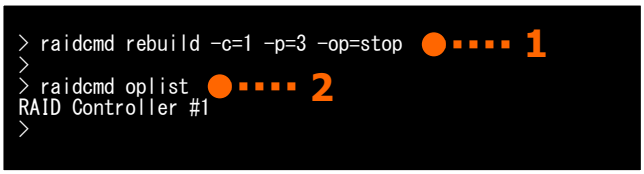


raidcmd

Use "**rebuild**" command.

Step 1 Execute "**rebuild**" command with -op option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device for which Rebuild is stopped
-p : Number of the Physical Device for which Rebuild is stopped
-op : Specify "stop" to stop Rebuild



Step 2 After the Rebuild is stopped, the raidcmd terminates normally. The stopped Rebuild disappears from the list of "**oplist**" command.

Checking Result of Executing Rebuild

You can find the result of executing Rebuild by checking the Tree View, the property of the Physical Device and the RAID Log of the Universal RAID Utility.
If Rebuild succeeds, the icon of the Physical Device subject to the Rebuild changes to [Online] on the Tree View. In addition, the [Status] in the Property tab of the Physical Device is set to [Online].

When detects something problem, Universal RAID Utility records the log in the RAID Log.

Setting Rebuild Priority

You can set the priority at which Rebuild is executed in the computer. The procedure of setting the Rebuild Priority is described below.

Setting Rebuild Priority are available only in the Advanced Mode.

RAID Viewer

Change the property of RAID Controller.

Step 1 Start the RAID Viewer. Click the RAID Controller on the Tree View. Then click [Properties] on the pull-down menu of menu item [File].

Step 2 Click the [Options] tab in the [RAID Controller Properties] dialog box. Change the value of [Rebuild Priority] to [High], [Middle], or [Low]. Click [OK] or [Apply].

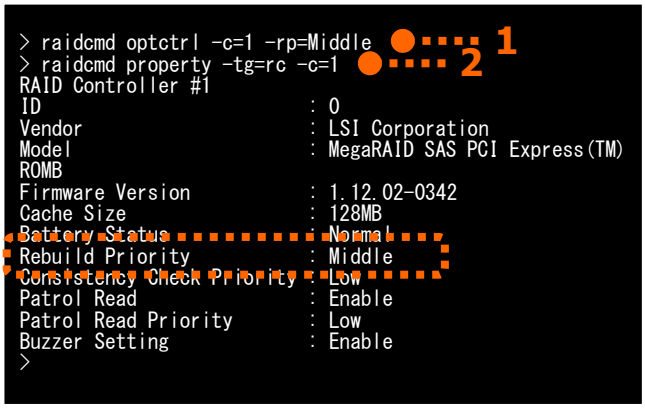
raidcmd

Use "**optctrl**" command.

Step 1 Execute "**optctrl**" command with -rp option and the defined parameters.

-c : Number of the RAID Controller for which Rebuild Priority is set
-rp : Value set after Rebuild Priority is set(Select a value out of High, Middle, and Low)

Step 2 Check the execution result by using "**property**" command.



Checking Location of Physical Device

The locate function can be used when you want to know the slot to which a specific Physical Device appearing in the RAID Viewer is inserted in the computer or enclosure. In actual, locate turns on the DISK lamp on the computer or enclosure in which the specified Physical Device is installed. (The DISK lamp blinks depending on the types of the computer or enclosures.) Searching for the Physical Device with the DISK lamp being ON allows the Physical Device for which "check location" is executed on the RAID Viewer and raidcmd to be identified.
The DISK lamp automatically is turned off in 3 minutes. Also, the RAID Controller may have the Turn off function according to the kind of RAID Controller.

IMPORTANT

RAID Viewer and raidcmd do not support the indication of the status (ON or OFF) of DISK lamp. Therefore, you can't recognize the location of the Physical Device when you turn ON the lamp of two or more Physical Devices at same time. You should turn ON the lamp of Physical Device one by one. It is convenient when you put down the number of the Physical Device which turned on a DISK lamp because you can confirm the number of the Physical Device when turn off the DISK lamp.

Procedure of Checking Location of Physical Device

Locate is executed for a Physical Device. The locate procedure is described below.

RAID Viewer

Use [Locate(Lamp)] in [Control] menu.

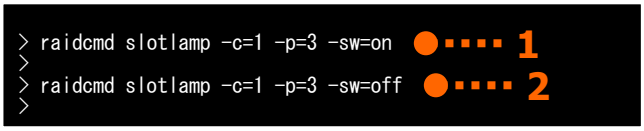
Step 1 Start the RAID Viewer. Click a Physical Device to be located on the tree view, select [Locate (Lamp)] on the pull-down menu of menu item [Control], and click [ON]. Then the DISK lamp on the Physical Device goes on (or blinks depending on the type of the computer). The DISK lamp automatically is turned off in 3 minutes.

Step 2 In case of the RAID Controller with Turn off function, [OFF] of [Locate(Lamp)] in the [Control] menu becomes enable. To turn off the DISK lamp, click a Physical Device to be located on the Tree View, select [Locate (Lamp)] on the pull-down menu of menu item [Control] and click [OFF].

raidcmd

Use "**slotlamp**" command.

Step 1 To turn on the DISK lamp for locate, execute "**slotlamp**" command with the -sw option set to "on" using the following parameters.



-c : Number of the RAID Controller containing the Physical Device for which its location is checked
-p : Number of the Physical Device for which its location is checked
-sw : Specify "on" to turn on the DISK lamp

Step 2 To turn off the lighting DISK lamp, execute "**slotlamp**" command with the -sw option set to "off".
If the RAID Controller does not support the "turning off the Disk lamp" function, the message indicating that it does not support the function is displayed and raidcmd is finished.

-c : Number of the RAID Controller containing the Physical Device for which its location is checked
-p : Number of the Physical Device for which its location is checked
-sw : Specify "off" to turn off the DISK lamp

Changing Status of Physical Device Forcibly

The function of changing status of a Physical Device forcibly can be used when you want to change the [Status] of a Physical Device to [Online] or [Failed] forcibly for a maintenance job or another. The function may not be used in normal operation.

IMPORTANT

- **The function of changing the status of a Physical Device forcibly is available only in the Advanced Mode.**
- **The system may not start if you forcibly change the status of the Physical Device used for the system drive. Do not change the status of the Physical Device used for the system drive forcibly.**

TIPS

The function of changing the status of a Physical Device forcibly may not be able to change the status to the desired one depending on the status of the Physical Device (such as a severe failure).

To [Online] Forcibly

To set the [Status] of a Physical Device to [Online] forcibly, use Make Online. The procedure of executing Make Online is described below.

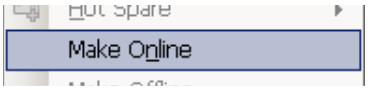
IMPORTANT

The consistency of Logical Drive will be lost if you forcibly change the status of the Physical Device used for the Logical Drive.

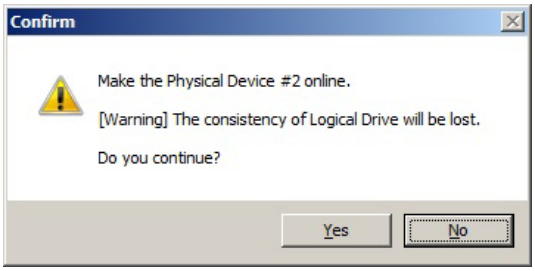
RAID Viewer

Use [Make Online] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Failed] on the Tree View. Then click [Make Online] on the pull-down menu of menu item [Control].



Step 2 Displays the Warning message and the confirmation message. Click [Yes], then [Status] of the Physical Device is changed to [Online].
Then click [No], without changing the status of the Physical Device.



Step 3 After the Make Online succeeds, [Status] of the Physical Device is changed to [Online].

raidcmd

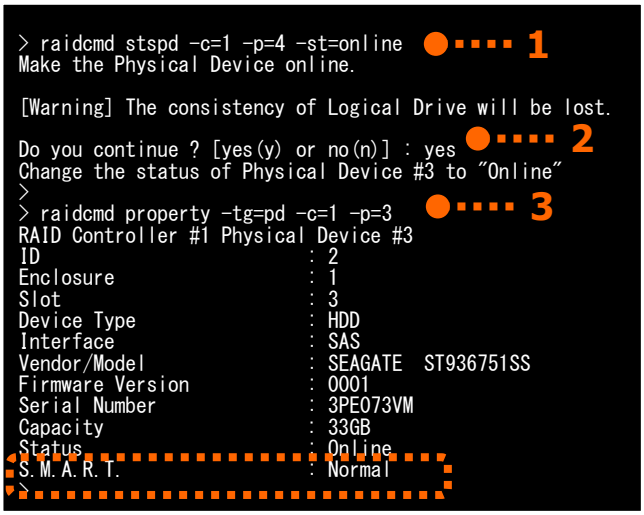
Use "**stspd**" command.

Step 1 Execute "**stspd**" command with -st option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device with its status set to [Online] forcibly
-p : Number of the Physical Device with its status set to [Online] forcibly
-st : Specify "online"

Step 2 Displays the Warning message and the confirmation message. Type "yes" to reply to the confirmation message. Then [Status] of the Physical Device is changed to [Online]. Type "No" to abort the change status of the Physical Drive.

Step 3 If "**stspd**" command succeeds, the [Status] of the Physical Device is set to [Online].


> raidcmd stspd -c=1 -p=4 -st=online
1
Make the Physical Device online.
[Warning] The consistency of Logical Drive will be lost.
Do you continue ? [yes(y) or no(n)] : yes
2
Change the status of Physical Device #3 to "Online"
>
> raidcmd property -tg=pd -c=1 -p=3
3
RAID Controller #1 Physical Device #3
ID : 2
Enclosure : 1
Slot : 3
Device Type : HDD
Interface : SAS
Vendor/Model : SEAGATE ST936751SS
Firmware Version : 0001
Serial Number : 3PE073VM
Capacity : 33GB
Status : Online
S.M.A.R.T. : Normal
>

To [Failed] Forcibly

To set the [Status] of a Physical Device to [Failed] forcibly, use Make Offline. The procedure of executing Make Offline is described below.

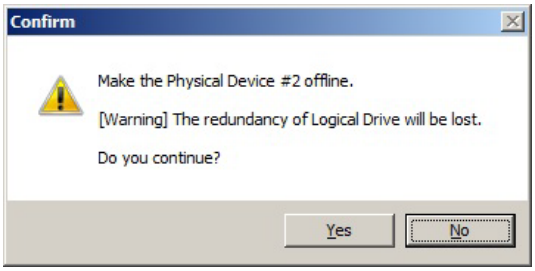
The redundancy of Logical Drive will be lost if you forcibly change the status of the Physical Device used for the Logical Drive.

RAID Viewer

Use [Make Offline] in [Control] menu.

Step 1 Start the RAID Viewer. Click a Physical Device with [Status] being [Online] on the Tree View. Then click [Make Offline] on the pull-down menu of menu item [Control].

Step 2 Displays the Warning message and the confirmation message. Click [Yes], then [Status] of the Physical Device is changed to [Failed].
Then click [No], without changing the status of the Physical Device.



Step 3 After the Make Offline succeeds, [Status] of the Physical Device is changed to [Failed].

raidcmd

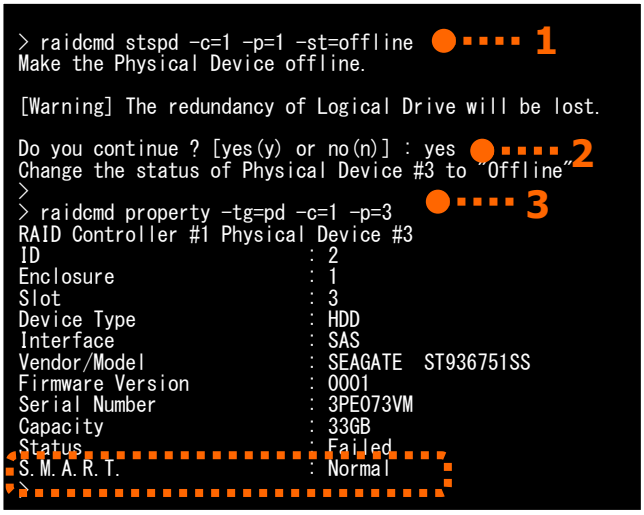
Use "**stspd**" command.

Step 1 Execute "**stspd**" command with -st option and the following parameters.

-c : Number of the RAID Controller containing the Physical Device with its status set to [Failed] forcibly
-p : Number of the Physical Device with its status set to [Failed] forcibly
-st : Specify "offline"

Step 2 Displays the Warning message and the confirmation message. Type "yes" to reply to the confirmation message. Then [Status] of the Physical Device is changed to [Failed]. Type "No" to abort the change status of the Physical Drive.

Step 3 If "**stspd**" command succeeds, the [Status] of the Physical Device is set to [Failed].


> raidcmd stspd -c=1 -p=1 -st=offline
1
Make the Physical Device offline.
[Warning] The redundancy of Logical Drive will be lost.
Do you continue ? [yes(y) or no(n)] : yes
2
Change the status of Physical Device #3 to "Offline"
>
> raidcmd property -tg=pd -c=1 -p=3
3
RAID Controller #1 Physical Device #3
ID : 2
Enclosure : 1
Slot : 3
Device Type : HDD
Interface : SAS
Vendor/Model : SEAGATE ST936751SS
Firmware Version : 0001
Serial Number : 3PE073VM
Capacity : 33GB
Status : Failed
S.M.A.R.T. : Normal
>

Troubleshooting RAID System

This chapter describes the troubleshooting of a RAID System done by using the Universal RAID Utility.
The Universal RAID Utility provides various measures to monitor occurrences of failures in the RAID System. The figure below shows the image of the troubleshooting function provided by the Universal RAID Utility.

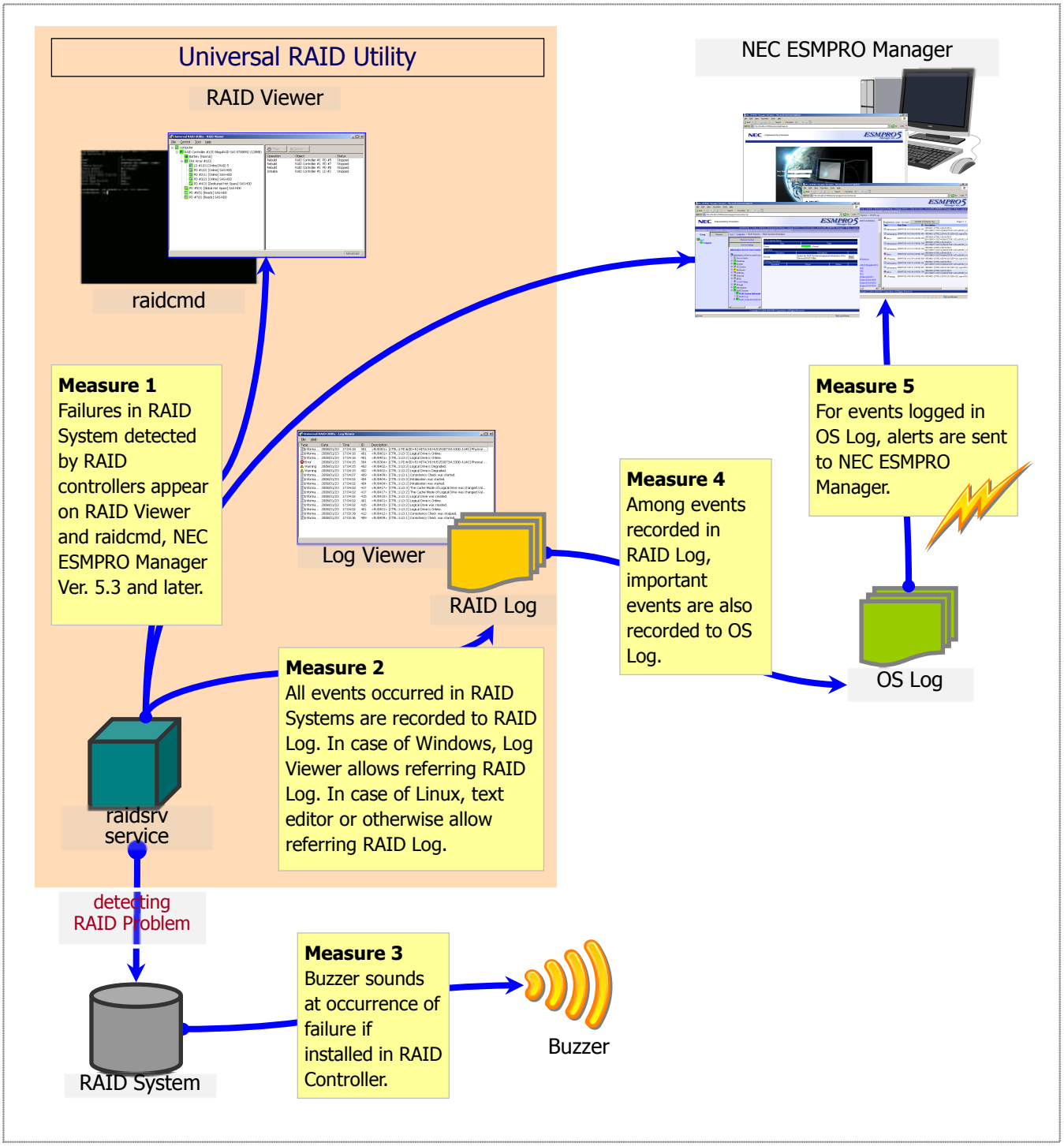

Universal RAID Utility
RAID Viewer
raidcmd
NEC ESMPRO Manager
Measure 1
Failures in RAID System detected by RAID controllers appear on RAID Viewer and raidcmd, NEC ESMPRO Manager Ver. 5.3 and later.
Log Viewer
RAID Log
Measure 4
Among events recorded in RAID Log, important events are also recorded to OS Log.
Measure 5
For events logged in OS Log, alerts are sent to NEC ESMPRO Manager.
OS Log
Measure 2
All events occurred in RAID Systems are recorded to RAID Log. In case of Windows, Log Viewer allows referring RAID Log. In case of Linux, text editor or otherwise allow referring RAID Log.
raidsrv service
detecting RAID Problem
Measure 3
Buzzer sounds at occurrence of failure if installed in RAID Controller.
Buzzer
RAID System

Figure 21 Troubleshooting image of RAID System

Failure Detection Measures

The Universal RAID Utility provides several fault detection measures as shown in Figure 21 Troubleshooting image of RAID System. The measures are described below.

Status Display by RAID Viewer

The RAID Viewer indicates the status of the RAID System with the icons of components on the Tree View and the [Status] in the Property tab of each component.
For details of the icons of components on the Tree View, see "Tree View".
See "Referring to Information on RAID System" about details of [Status] in the Property tab.

Status Display by raidcmd

You can see the status of each component in a RAID System by using "**property**" command. For the information in the property, see "Referring to Information on RAID System

Logging Events to RAID Log

The Universal RAID Utility logs all events occurred in the RAID System to the RAID Log in the Universal RAID Utility. The data in the RAID Log can be seen by using a text editor or Log Viewer (when the operating system is Windows). For details of the Log Viewer, see "Functions of Log Viewer".
Note the character code when you see the RAID Log.

Operating System	Path and File Name	Character Code
Windows	(installed folder)/server/raid.log	UTF-8
Linux	/var/log/raidsrv/raid.log	When the character code of the operating system is EUC : EUC When the character code of the operating system is not EUC : UTF-8
VMware ESX	/var/log/raidsrv/raid.log	UTF-8

For details of events to be registered to the RAID Log, see " Appendix C : Logs/Events ".

The registration of the event to RAID Log starts when raidsrv service is begun, and stops when raidsrv service is stopped. The event happened when raidsrv service has stopped is not registered to RAID Log.

Buzzer in RAID Controller

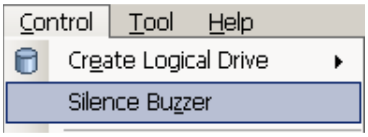
If a RAID Controller is equipped with a Buzzer, the RAID Controller sounds the Buzzer for some types of failures occurred.
The Buzzer sounds until the stopping it by RAID Viewer or raidcmd.

RAID Viewer

Use [Silence Buzzer] in [Control] menu.

Step 1 Start the RAID Viewer. Check the component in which a failure occurs on the Tree View.

Step 2 Click the RAID Controller containing the component in which the failure occurs. The click [Silence Buzzer] on the pull-down menu of menu item [Control].



You can click menu item [Silence Buzzer] whether a Buzzer sounds or not. Nothing is done if no Buzzer sounds.

raidcmd

Use "**sbuzzer**" command.

Step 1 Execute "**sbuzzer**" command with the following parameter.

-c : Number of the RAID Controller for which Buzzer is stopped

Logging Events to OS Log

Among RAID System events logged in the RAID Log, the Universal RAID Utility also logs important events to the OS Log. OS Log is the event log(system) in Windows or the syslog in Linux.
For events to be logged in the OS log, see " Appendix C : Logs/Events ".

Sending Alert to NEC ESMPRO Manager

Among RAID System events logged in the OS Log, the Universal RAID Utility sends important events which may affect the operations and managements of the computer to the NEC ESMPRO Manager as alerts. To send alerts, the event monitoring function provided by the NEC ESMPRO Agent can be used. If the NEC ESMPRO Agent is installed in the computer in which the Universal RAID Utility is installed and alert transmission is set, RAID System events detected by the Universal RAID Utility will be automatically subject to alert transmission to the NEC ESMPRO Manager.
For alerts sent to the NEC ESMPRO Manager, see " Appendix C : Logs/Events ".

For alert transmission provided by the NEC ESMPRO Agent, see the relevant documentation of the NEC ESMPRO Agent.

Using report coordination of NEC ESMPRO/AlertManager

To use alerts on report coordination of the NEC ESMPRO/AlertManager, add the following registry to the computer in which the NEC ESMPRO Manager is installed.
If the registry has existed already, you do not need to correct the registry additionally.

Registry key

CPU architecture (x86) :
HKEY_LOCAL_MACHINE\SOFTWARE\NEC\NVBASE\AlertViewer\AlertType\URAIDUTL

CPU architecture (x64) :
HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\NEC\NVBASE\AlertViewer\AlertType\URAIDUTL

Values

Name	Type	Data
WavDefault	REG_SZ	Default.wav
AniDefault	REG_SZ	Default.bmp
Image	REG_SZ	Default.bmp
SmallImage	REG_SZ	Default.bmp

Permission

In case of the operation system is Windows XP(exclude Home Edition), Windows 2000, Windows Server 2003, Windows NT, add the following permissions.

Name	Type
Administrators	Full Control
Everyone	Read
SYSTEM	Full Control
ESMPRO User Group	Full Control

ESMPRO User Group is the name group for the management of NEC ESMPRO Manager (specified it when installed NEC ESMPRO Manager). If you forget the name of group, see the following registry key.

CPU architecture (x86) : HKEY_LOCAL_MACHINE\SOFTWARE\NEC\NVBASE

CPU architecture (x64) : HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node \NEC\NVBASE

Value : LocalGroup

Monitoring Faults of Physical Devices

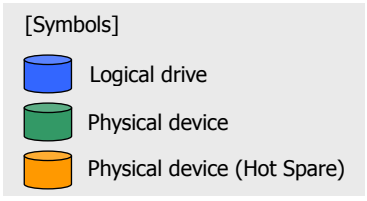
The Universal RAID Utility can take the following measures to monitor failures of Physical Devices detected by RAID Controllers.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

If a Physical Device used for a Logical Drive is failed, the status of the Physical Device changes to [Failed].
In addition, the status of the Logical Drive using the Physical Device changes to [Degraded] or [Offline] depending on the redundancy. The status of the Physical Device and Logical Drive remains unchanged until the problem is solved.

The RAID Viewer indicates the status of Physical Devices and Logical Drives with their icons on the Tree View and their properties. In addition, the RAID Viewer shows the status from the viewpoint of the RAID System and from the viewpoint of the computer on the Tree View.
The raidcmd indicates the status of Physical Devices and Logical Drives on their properties.

The display of the RAID Viewer depending on the change of Physical Device status is described below.



Operation in no failures of Physical Devices

If all Physical Devices used by a Logical Drive operates normally (with their [Status] being [Online]), the Logical Drive is in the online status (with its [Status] being [Online]).

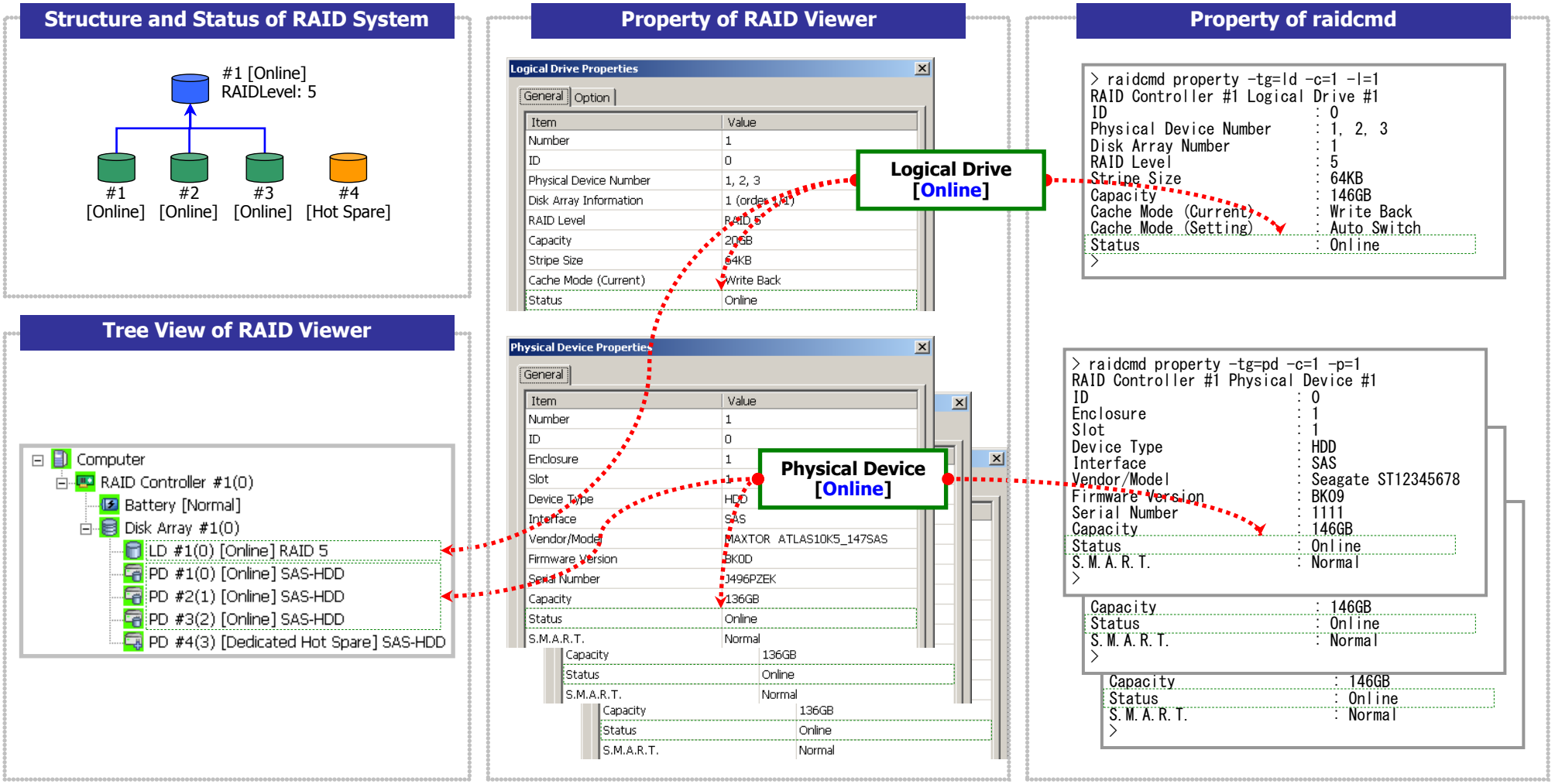


Figure 22 Display of RAID Viewer / raidcmd (No failures of Physical Devices)

Operation when redundancy of Logical Drive degraded or lost due to failure of Physical Device

If one or more Physical Devices used by a Logical Drive are failed (with their [Status] being [Failed]) to degraded (one Physical Device of RAID Level 6 is failed) or lost (one Physical Device of RAID Level 1 or 5 is failed, two Physical Devices of RAID Level 6 is failed) the redundancy of the Logical Drive, the Logical Drive is degraded (with its [Status] being [Degraded]).

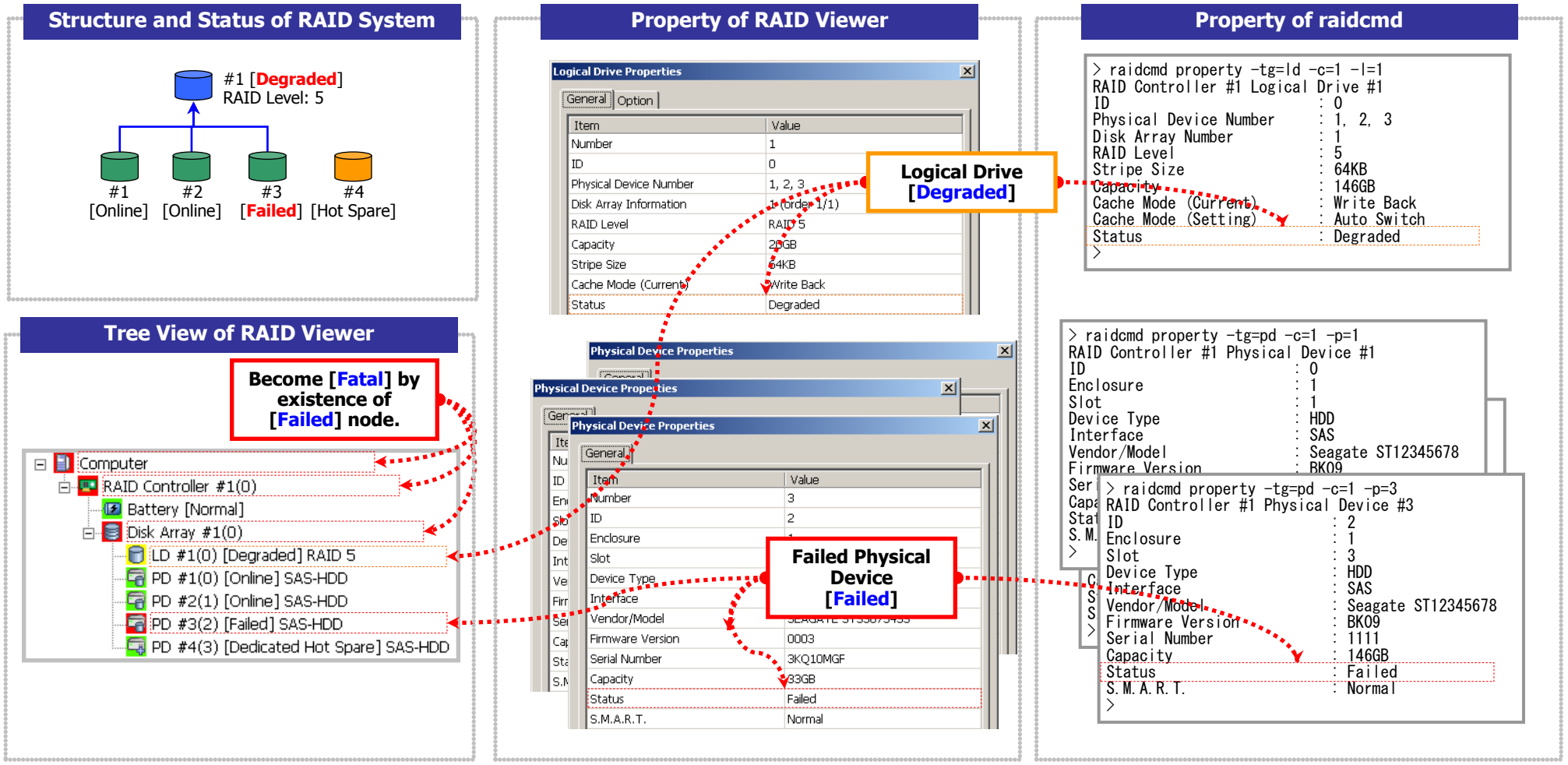


Figure 23 Display of RAID Viewer / raidcmd (Lost the redundancy of Logical Drive)

Operation when failed Physical Device is replaced to recover RAID System

Using the RAID System continuously with the redundancy of a Logical Drive remaining degraded may cause the data in the Logical Drive to be lost when another Physical Device is failed further. Recover a Logical Drive of degraded redundancy by Hot Spare or replacement of the failed Physical Device.
If Hot Spare or replacement of a failed Physical Device operates Rebuild, the status of the Physical Device changes during the rebuilding (with its [Status] changed to [Rebuilding]).

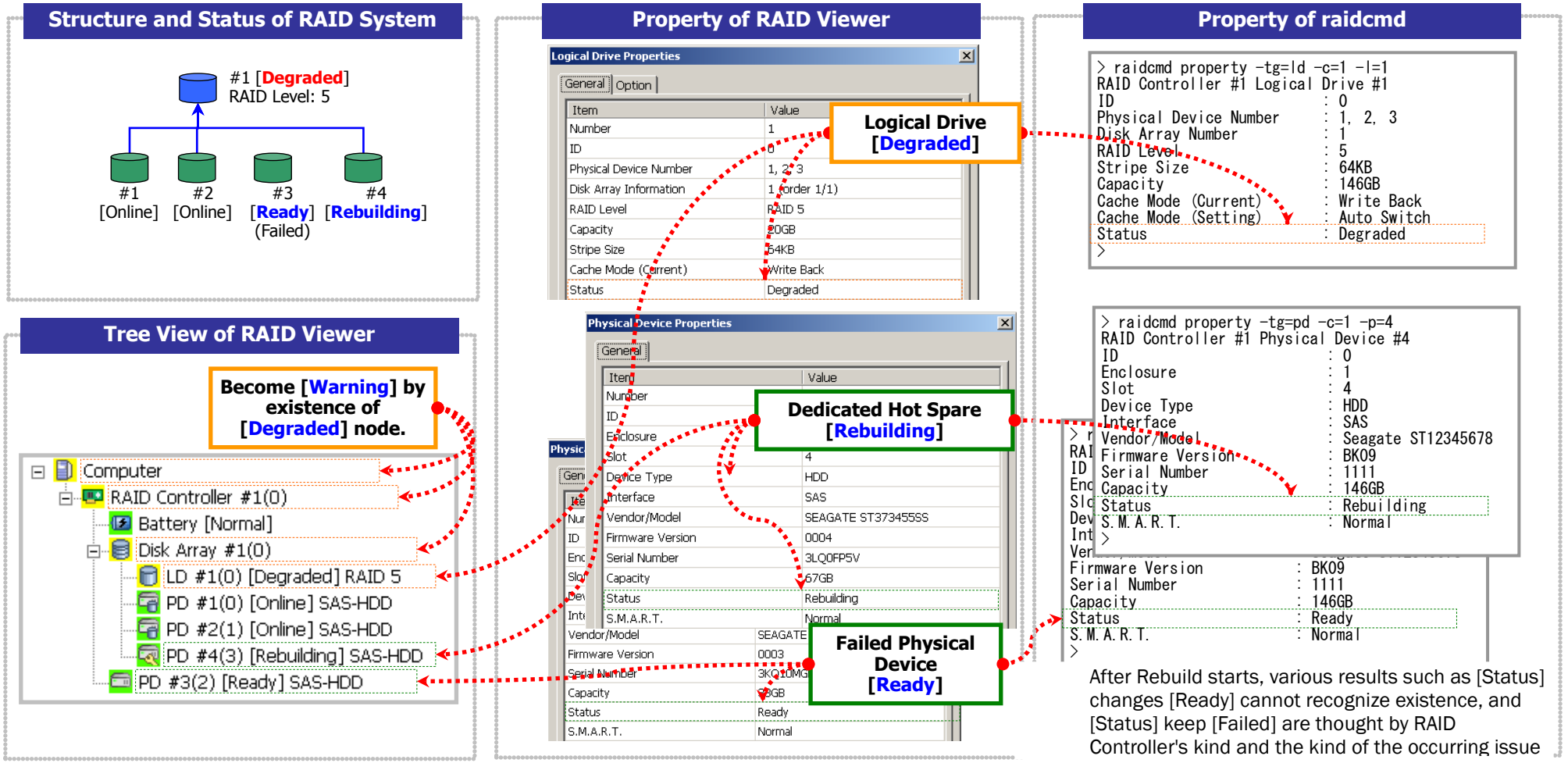


Figure 24 Display of RAID Viewer /raidcmd (Rebuilding of Physical Device)

Operation when the Logical Drive is offline due to failure of Physical Device

If you continue to use the RAID System with lost redundancy of a Logical Drive and another Physical Device is failed further, the redundancy of the Logical Drive is lost completely (two or more Physical Devices of RAID Level 1 or 5 is failed, three or more Physical Devices of RAID Level 6 is failed). The status of a Logical Drive without redundancy is offline (with its [Status] being [Offline]). The data in a Logical Drive in the offline status is lost. Replace all failed Physical Devices and Rebuild the RAID System.

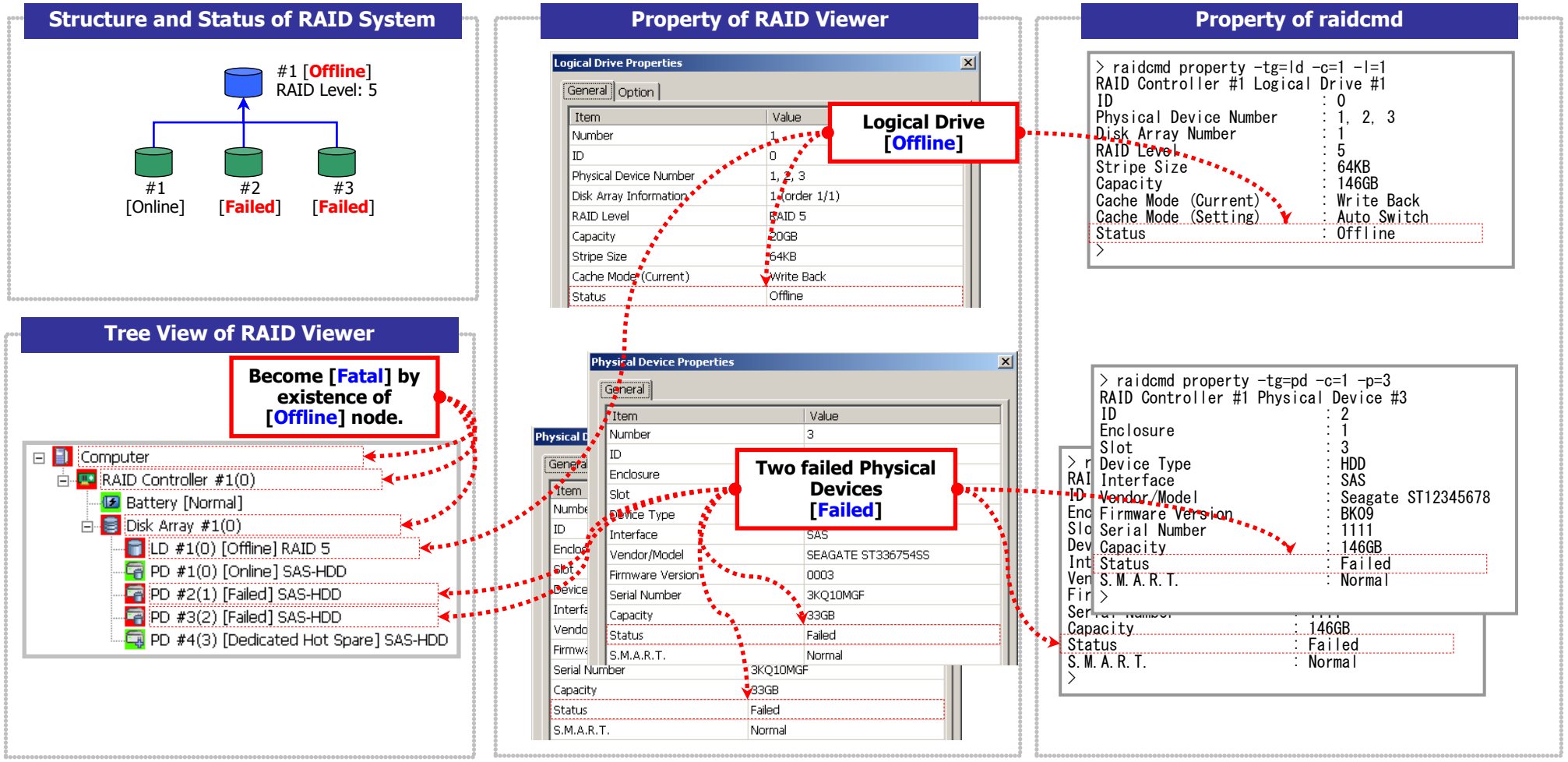


Figure 25 Display of RAID Viewer / raidcmd (Under lost redundancy of Logical Drive)

Monitoring Battery Status

The Universal RAID Utility can monitor Battery status which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors events of the Battery installed in the RAID Controller. The Universal RAID Utility logs detected Battery events in the RAID Log. Any event indicating occurrence of a problem in the Battery reflects to the [Status] of Battery on RAID Viewer and the [Battery Status] of RAID Controller on raidcmd (changes the status to [Warning]). The Battery status is retailed until the problem is solved.

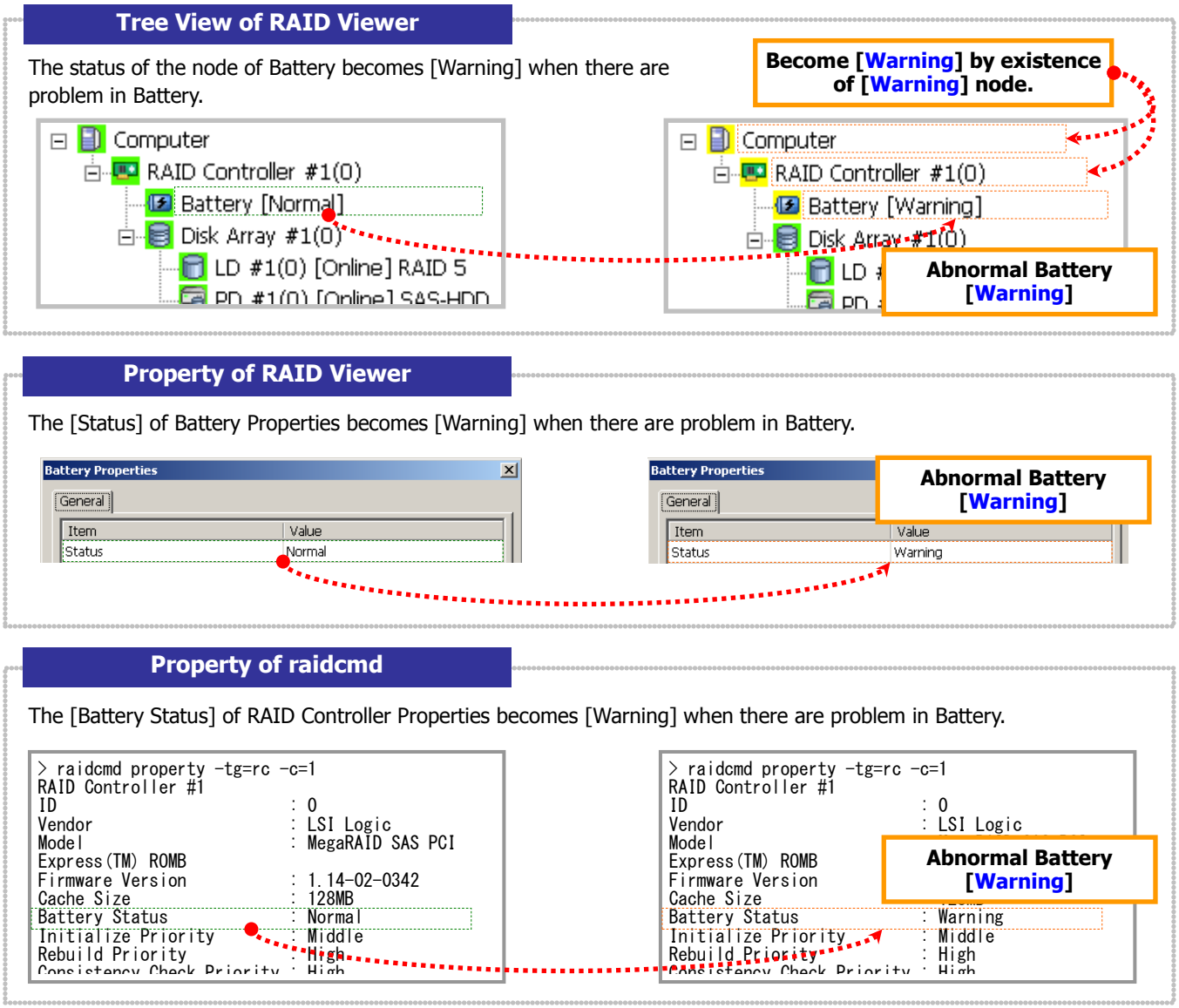


Figure 26 Display of RAID Viewer / raidcmd (Abnormal Battery operation)

Monitoring Enclosure Status

The Universal RAID Utility can monitor enclosure status which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors events of the enclosure detected by the RAID Controller. The Universal RAID Utility logs detected enclosure events to the RAID Log. In addition, the Universal RAID Utility records important event to the OS log and sends alerts to the NEC ESMPRO Manager.
The RAID Viewer and raidcmd do not indicate the severity of events in this category to Tree View and the property of RAID System.

See " Appendix C : Logs/Events " for detail about the event of enclosure.

Monitoring Various Events of RAID System

The Universal RAID Utility can monitor other events which the RAID Controller detects by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors various events of the RAID System as well as failures of Physical Devices, Battery events and enclosure events described above. The Universal RAID Utility logs events detected in the RAID System to the RAID Log. In addition, the Universal RAID Utility records important events to the OS log and send alerts to the NEC ESMPRO Manager.
The RAID Viewer and raidcmd do not indicate the severity of events in this category to Tree View and the property of RAID System.

See " Appendix C : Logs/Events " for detail about the various event of RAID System.

Replacing Physical Device for Prevention

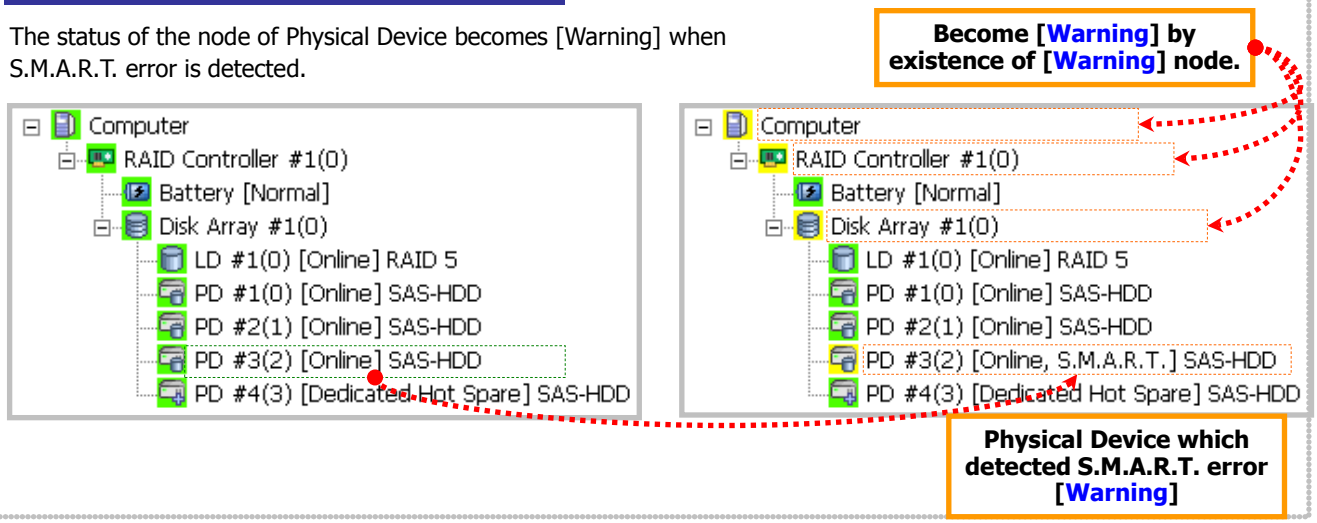
If Physical Devices support S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) and the RAID Controller can detects S.M.A.R.T. errors, the Universal RAID Utility can monitor the S.M.A.R.T. errors by the following means.

RAID Viewer raidcmd	RAID Log	Buzzer	OS Log	Alert
✓	✓	Depending on type of RAID Controller	✓	✓

The Universal RAID Utility monitors S.M.A.R.T. errors occurred in Physical Devices. Detecting a S.M.A.R.T. error, the Universal RAID Utility logs the event to the RAID Log. In addition, the Universal RAID Utility reflects the status of S.M.A.R.T. in a Physical Device as the status of the Physical Device (by changing the status of the Physical Device to [Warning]). The status of the Physical Device is retained as its status until the S.M.A.R.T. error is solved.

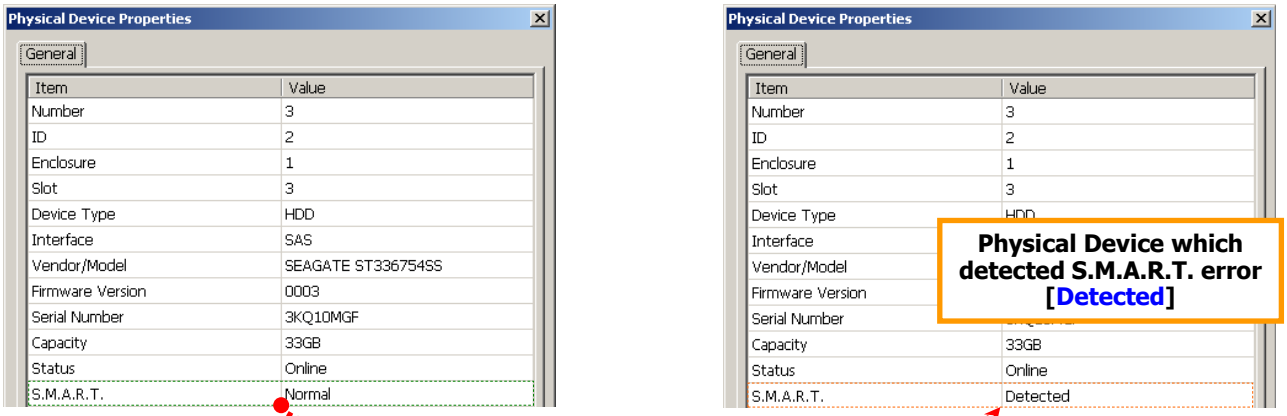
Tree View of RAID Viewer

The status of the node of Physical Device becomes [Warning] when S.M.A.R.T. error is detected.


Become [Warning] by existence of [Warning] node.
Computer
RAID Controller #1(0)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
Computer
RAID Controller #1(0)
Battery [Normal]
Disk Array #1(0)
LD #1(0) [Online] RAID 5
PD #1(0) [Online] SAS-HDD
PD #2(1) [Online] SAS-HDD
PD #3(2) [Online, S.M.A.R.T.] SAS-HDD
PD #4(3) [Dedicated Hot Spare] SAS-HDD
Physical Device which detected S.M.A.R.T. error [Warning]

Property of RAID Viewer

The [S.M.A.R.T.] of Physical Device Properties becomes [Detected] when S.M.A.R.T. error is detected.



Property of raidcmd

The [S.M.A.R.T.] of Physical Device Properties becomes [Detected] when S.M.A.R.T. error is detected.

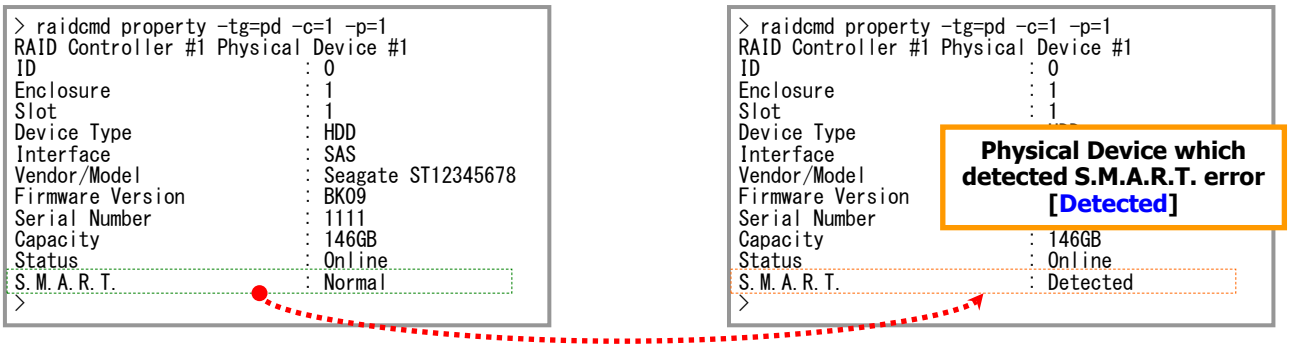


Figure 27 Display of RAID Viewer / raidcmd (Detection of S.M.A.R.T. error)

Management of RAID System using NEC ESMPRO Manager

You can manage the RAID System managed Universal RAID Utility on NEC ESMPRO Manager by NEC ESMPRO Manager Ver. 5.3 or later. This chapter describes the point that should be noted when the RAID System is managed by using NEC ESMPRO Manager.
See the instruction of NEC ESMPRO Manager about system requirements and how to use.

System Requirement and Installation

Version of NEC ESMPRO Manager

The version of NEC ESMPRO Manager that can manage the system that installs Universal RAID Utility Ver2.4 is Ver. 5.3 or later.

Using RAID System Management Mode

The user account of NEC ESMPRO Manager has the attribute of RAID System Management Mode of Universal RAID Utility. There is not the function of changing RAID System Management Mode.

Using "Standard Mode"

The user accounts of NEC ESMPRO Manager (not include Administrator) has the authority of "Standard Mode" in default.
If you change the RAID System Management Mode authority of user account, change the setting of [User Information]. In [User Information] view, change the [RAID System Management Mode] to [Standard Mode].
See the instruction of NEC ESMPRO Manager to change the [User Information].

Using "Advanced Mode"

The Administrator account of NEC ESMPRO Manager has the authority of "Advanced Mode" in default.
If you change the RAID System Management Mode authority of user account, change the setting of [User Information]. In [User Information] view, change the [RAID System Management Mode] to [Advanced Mode].
See the instruction of NEC ESMPRO Manager to change the [User Information].

Function that can be used in NEC ESMPRO Manager

You can use the following functions ("Usable" is "✓") on NEC ESMPRO Manager.

Category	Function	Standard	Advanced	Memo
View Information	Tree View	✓	✓	
	Property	✓	✓	
	Rescan	✓	✓	Allow it by [Rescan] in [RAID System Information] tree
	View RAID Log	✓	✓	Display it [RAID Log] tree
Configuration	Make Logical Drive(Simple)			
	Make Logical Drive(Custom)			
	Hot Spare(Make/Delete)			
	Deleting Logical Drive			
	Easy Configuration			
Operation	Monitoring Operation (include Stop Running Operation)	✓	✓	Display it [Running Operation] in [RAID System Information] tree
	Consistency Check	✓	✓	
	Consistency Check (Scheduled)	-	-	Allow it [Remote Batch] tree (Only the user with an administrator right is practicable)
	Initialize		✓	
	Rebuild		✓	
Maintenance	Alert to NEC ESMPRO Manager	✓	✓	
	Stop Buzzer	✓	✓	
	Checking Location of Physical Device	✓	✓	
	Changing Status of Physical Device (Online, Failed)		✓	
Changing of Settings	Parameters of RAID Controller		✓	
	Parameters of Logical Drive		✓	
Other functions	Change RAID System Management Mode	-	-	Each user account of NEC ESMPRO Manager has the attribute of RAID System Management Mode about Universal RAID Utility
	CLI(Command Line Interface)			

Changing of Settings of Universal RAID Utility

This chapter describes how to change the settings of the Universal RAID Utility.

Changing TCP port number

If the TCP port number using Universal RAID Utility is same one of other application, you can change the TCP port number using Universal RAID Utility.

> **IMPORTANT** **A user having the administrator authority should change the TCP port number. Only users having the administrator authority can change the TCP port number.**

Using Windows as Operating System

Step 1 Log on to the computer as a user having the administrator authority.

Step 2 Abort the RAID Viewer, Log Viewer, and raidcmd if they are used.

Step 3 Stop raidsrv service. If manages the RAID System by NEC ESMPRO Manager Ver. 5.3 or later, stop raidsrv Agent service and eciService too. Click [Start] - [Control Panel]. Then double click [Management Tool] - [Services]. Click [raidsrv] service and [Stop] of [Control] menu after displays service list. And stop [Universal RAID Utility raidsrv Agent] service and [eciService] by the same way.

Step 4 There are two of more parts in configuration file of raidsrv service ,RAID Viewer, raidcmd and raidsrv Agent service about data port, event port and communication port with NEC ESMPRO Manager. Change the two of more parts in each configuration file.

module	path and configuration file name	data port	event port	communication port with NEC ESMPRO Manager
raidsrv service	(installed folder) \server\raidsrv.conf	[socket] section data port	[socket] section event port	none
RAID Viewer	(installed folder) \gui\raidview.conf	[network] section port	[network] section port_listen	none
raidcmd	(installed folder) \cli\raidcmd.conf	[network] section port	none	none
raidsrv Agent service	(installed folder) \server \raidsrv_agent.conf	[network] section data_port	[network] section event_port	[network] section agent_port

> **TIPS** The default folder after installation is %SystemDrive%\Program Files\Universal RAID Utility when the architecture of CPU is x86. It is % SystemDrive%\Program Files (x86)\Universal RAID Utility when the architecture of CPU is x64.

Step 5 If complete to modify all of configuration files, start raidsrv service, raidsrv Agent service and eciService. Click [Start] - [Control Panel]. Then double click [Management Tool] - [Services]. Click [Universal RAID Utility] service and [Start] of [Control] menu after displays service list. And start [Universal RAID Utility raidsrv Agent] service and [eciService] by the same way.

Using Linux or VMware ESX as Operating System

Step 1 Log in to the computer as a user having the administrator authority.

Step 2 Abort the raidcmd if it is used.

Step 3 Stop raidsrv service.
If the RAID System is managed by NEC ESMPRO Manager Ver. 5.3 or later, raidsrv Agent service and eciService will also be stopped.

Step 4 You must change TCP port number in the configuration file of raidsrv service, RAID Viewer, raidcmd or raidsrv Agent service for date port, event port, and communication port of NEC ESMPRO Manager.

module	path and configuration file name	data port	event port	communication port with NEC ESMPRO Manager
raidsrv service	/etc/opt/nec/raidsrv/ raidsrv.conf	[socket] section data port	[socket] section event port	none
raidcmd	/etc/opt/nec/raidcmd/ raidcmd.conf	[network] section port	none	none
raidsrv Agent service	/etc/opt/nec/raidsrv/ raidsrv_agent.conf	[network] section data_port	[network] section event_port	[network] section agent_port

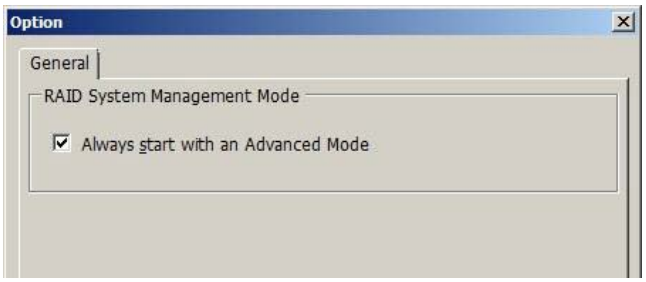
Step 5 After the modification is finished, start the raidsrv service, raidsrv Agent service and eciService.

Changing RAID System Management Mode at Start of RAID Viewer

The RAID Viewer is started in the Standard Mode by default. The setting can be changed so that the RAID Viewer is always started in the Advanced Mode as described below.

Step 1 Click [Option] on the pull-down menu of menu item [Tool].

Step 2 Check the [Always start with an Advanced Mode] check box in the [General] tab of the [Option] dialog box.



The setting of [Always start RAID Viewer in Advanced Mode] is enabled at the next start of the RAID Viewer.

Notes on Use of Universal RAID Utility

This chapter describes the notes on use of the Universal RAID Utility.

Operation Environment

Use of IPv6

The Universal RAID Utility cannot operate in the IPv6 (Internet Protocol version 6) environment. Use the Universal RAID Utility in the IPv4 environment. To manage a RAID System in the IPv6 environment, use the BIOS utility of the RAID Controller.

Support for Solid State Drive (SSD)

The RAID Viewer and raidcmd of Universal RAID Utility Ver2.31 or later, display the Solid State Drive connected to the onboard RAID Controller (LSI Embedded MegaRAID™) as Hard Disk Drive.
After updating Universal RAID Utility from Ver2.3 or the older versions (where the Solid State Drive is displayed as it is) to Ver2.31 in the onboard RAID Controller (LSI Embedded MegaRAID™) environment, the Solid State Drive will be displayed as Hard Disk Drive.
To display the Solid State Drive correctly in the environment where the onboard RAID Controllers (LSI Embedded MegaRAID™) is used, you need the driver (ver14.00.1026 or later) which supports the Solid State Drive. Please check if the version of driver is 14.00.1026 or later.
Please be careful not to configure Logical Drive mixing Solid State Drives and Hard Disk Drives in the onboard RAID Controller (LSI Embedded MegaRAID™) environment.
The Logical Drive of which Solid State Drives and Hard Disk Drives are the members may be created in the following cases.

The functions of possibility mixing SSD and HDD

- Easy Configuration
  Do not use Easy Configuration. If you want to create the Logical Drives, see "Creating Logical Drive Easily" or "Creating Logical Drive Freely".
- Create Logical Drives (Simple/Custom)
  When you select Physical Devices, please be careful not to configure Logical Drive mixing Solid State Drives and Hard Disk Drives.
- Rebuild
  Please check if the device type of the Physical Device is SSD or HDD, then replace the Physical Device with the proper type of device before rebuilding if required.

How to distinguish SSD and HDD

Please see Property of the Physical Device and check "Capacity". If the Physical Device is SSD, "Capacity" of property displays 30GB, 50GB or 100GB.

If you want to know how to see Property of Physical Device, see "Referring to Property of Physical Device".

Installation / Uninstallation

DistributedCOM event is registered during installing or uninstalling

The following events might be registered in the event log of OS during installation or uninstallation of Universal RAID Utility under Windows Server 2008 R2 or Windows 7. Even if the following events are registered, there is no problem in the operation of the system and Universal RAID Utility.

Source	Event ID	Description
DistributedCOM	10001	Unable to start a DCOM Server: {E9513610-F218-4DDA-B954-2C7E6BA7CABB} as /.

RAID Viewer, Log Viewer

Verification of Authenticode signature at the startup of the RAID Viewer and Log Viewer

RAID Viewer and Log Viewer have an Authenticode signature. When you start the Microsoft .NET Framework Version 2.0 managed application that has an Authenticode signature, .NET Framework Version 2.0 verify the validation of Authenticode signature. Therefore if you use the computer not connected network and the computer connected bad quality network, may wait a few minutes until startup the RAID Viewer and Log Viewer.

Information
http://support.microsoft.com/kb/936707/en

About the startup without Microsoft .NET Framework Ver2.0 or later

RAID Viewer and Log Viewer will fail to start if you do not install Microsoft .NET Framework Version 2.0 or later in advance.

1. When the version that is older than Microsoft .NET Framework Version 2.0 exists
   The message dialog to show the occurrence of the initialization error of .NET Framework is displayed.
2. When .NET Framework does not exist
   The message dialog to show the occurrence of the application error which generated by the link error of .NET Framework is displayed.
   And, the following events are registered in the event log of OS.

Source	Event ID	Description
Application Popup	26	Application popup: raidview.exe(or rlogview.exe) – Application Error : The application failed to initialize properly (0xc0000135). Click on OK to terminate the application.

You must install Microsoft .NET Framework Version 2.0 or higher to use the RAID Viewer and Log Viewer.

About the start when Runtime component of Microsoft Visual C++ 2005 SP1 library does not exist

RAID Viewer fails in the start if it doesn't install Runtime component of Microsoft Visual C++ 2005 SP1 library.

1. When Runtime component of Microsoft Visual C++ 2005 SP1 library does not exist
The message dialog to show the occurrence of the problem is displayed, because the DLL of Runtime component of Microsoft Visual C++ 2005 SP1 library cannot be loaded.

   And, the following events are registered in the event log of OS.

Source	Event ID	Description
SideBySide	32	Dependent Assembly Microsoft.VC80.CRT could not be found and Last Error was The referenced assembly is not installed on your system.
SideBySide	59	Resolve Partial Assembly failed for Microsoft.VC.80.CRT. Reference error message: The referenced assembly is not installed on your system.
SideBySide	59	Generate Activation Context for (installation folder of Universal RAID Utility)\gui\bridge.dll. Reference error message: The operation completed successfully.

   You must install Runtime component of Microsoft Visual C++ 2005 SP1 library to use the RAID Viewer.

NEC ESMPRO Manager

Simultaneous operation from two or more NEC ESMPRO Manager

The following error might occur from NEC ESMPRO Manager to RAID System when runs the operation. When the following error occurs, there is a possibility of running the operation at the same time from other NEC ESMPRO Manager to same RAID System. Please changes timing if whether it operates it like this is confirmed, and it goes and operate it again.

"The system error occurred. Please ask it which component has broken."